Machine Shop

VOLUME 16 . NUMBER 9



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Be permanently tooled-up-ready for any War or Post-War Job

Each ARMSTRONG TOOL HOLDER is more than a highly efficient tool. It is a part of a complete "System" of tooling that provides permanent, multi-purpose tools for every operation on lathes, planers, slotters and shapers. Now is the time to tool every machine tool with its full complement of ARMSTRONG TOOL HOLDERS. (1st) To increase War Production—with the correct ARMSTRONG TOOL HOLDER for each operation you can greatly increase speeds and feeds beyond "Standard" cutting speeds, can often double hourly output. (2nd) To be permanently tooled-up, able to instantly change over to any new War Product. (3rd) To be efficiently tooled-up and ready for post-war competition.

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Machine Shop

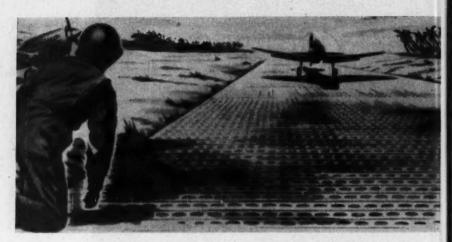
FEBRUARY, 1944

Vol. 16, No. 9

CINCINNATI, OHIO

We Present ---

- —as the feature article in this month's issue a timely story on the construction of airplane landing mats, by Gordon Robertson, Industrial Division, The Sherwin-Williams Co. Every manufacturer who has had to convert from civilian to war production eventually had to decide where to cease thinking in terms of present practice and available equipment and develop original engineering ideas. In this article, Mr. Robertson cites an interesting case history wherein the engineering that preceded the actual fabrication and finishing of portable airfield landing mats played a major role in obtaining high volume and high quality output.
- —on page 138—an article on the use of "Utilization Boards" at the Schenectady Works of the General Electric Co. for keeping shop executives posted as to status of machines in shop; whether employed, idle, under repair, or available for work from other shops or departments. The information presented herein should be of great help to executives in other plants in planning similar centralized control systems.
- —on page 154—" "Tear Drops' for Tojo"—a very interesting outline of how a modern application of the welding principle at Lockheed Aircraft Corporation, Los Angeles, is expediting the defeat of Japan. This article explains and illustrates the welding methods and equipment employed by Lockheed in fabricating streamlined, laminar-flow drop tanks ("tear drops") which enable Lockheed Lightning P-38's and other American aircraft to carry the aerial war right into the backyard of the enemy.
- on page 178 an article of particular interest to designers and engineers, entitled "An Approach to Functional Design Standards."
- on page 194—C. W. Hinman's "Progressive Dies Are Important Tools"—a story giving details in the manufacture of such popular tool parts as plier handles.
- on page 205 descriptions and illustrations of several tools and devices, submitted by some of our readers with the intention of aiding shop workers in performing particular jobs with greater ease, speed, and safety.
- the usual "Modern Equipment at Work" and "New Shop Equipment" sections, cartoon, and other features,



(Courtesy Pennsylvania Salt Co.)

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The Construction of Airplane Landing Mats

Engineering the Job from Start to Finish

By GORDON ROBERTSON
Industrial Division. The Sherwin-Williams Co.

If there is any one group of metalworking manufacturers that finds its products of equal importance in war and in peace, it is the farm implement makers. The role played by food in winning the war has been favorably compared to that played by tanks, guns and ships.

Consequently, when the Empire Plow Company of Cleveland, Ohio, was asked by the United States Army Corps of Engineers to produce a tremendous quantity of portable airfield landing mats, it could not, like so many former civilian manufacturers, immediately put aside its peacetime products and operate wholly on direct military production. Rather, the objective was to continue the production of plows, harrows, rakes, and so on, and at the same time fabricate—on a mass production scale—an item that was heavy, bulky, yet required numerous manufacturing operations many of which were of a complex and semi-precise nature.

Past experience in the production of landing mats was sketchy at best

Every manufacturer who has had to convert from civilian to war production eventually had to decide where to cease thinking in terms of present practice and available equipment and develop original engineering ideas. Mr. Robertson cites an interesting case history wherein the engineering that preceded the actual fabrication and finishing of portable airfield landing mats played a major role in securing high volume and high quality output.

and of limited helpfulness. Attempts had been made to engineer a tooling and finishing set-up for mats but with little success. In some instances the

number of fabricating, finishing and handling operations ran as high as 40.

The first step towards a solution was the designing of multiple - operation combination dies to be used for forming and stamping sheets. Four operations were combined in a single movement of the press. Next was the installation of gravity roller conveyors and overhead cranes to speed up and facilitate handling of sheets

and partially formed mats to and from the presses. The final principle applied was the complete mechanization of the finishing operations from the





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Unloading 10 - Gauge
Steel Sheets from
Freight Cars to be
Stamped and Formed
into Portable Air Field
Landing Mats. The
Sheets are Received
in Bundles Weighing
Five Tons Each



(Lett) — With This Press Brake Two Beads are Formed on the Sheet to Stiffen and Strengthen the Mat. Five-Ton Bundles are Placed on the Gravity Roller Conveyor, From Which the Sheets are Fed to the Press by Two Operators. (Below) — Stamping Extruded Holes and "Bayonets" in the Beaded Sheet, Using a Die Press. The Mat is Formed in Two Strokes of the Press, and No Strokes are Missed in Feeding and Extracting the Mats. This View Shows the Rear of the Press, Where the Sheetis Beng Inserted

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Close-Up View of Lower Half of Die

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time the completed mat leaves the last of three presses until it is packed for shipment overseas.

Landing Mat Design and Fabrication

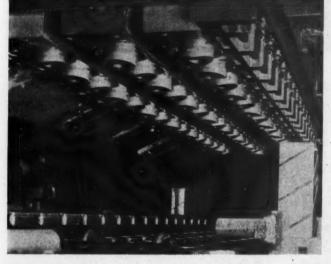
The design of the mat itself is relatively simple. Width is a standard 19½ inches. Because the mats in service are laid in such a way as to avoid a continuous seam, two

lengths were specified, 10 feet and 5 feet, the shorter mats being used to fill in at the runway edges. Thirty inter-



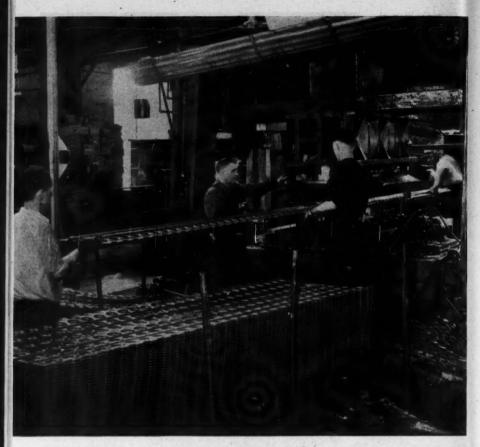
locking projections or "bayonets" are located on either side of the mat. Two corrugations run the length of the mat

> to stiffen the 10gauge steel sheets that are used. For lightness in use, each mat is perforated with 3 rows of 29 slightly extruded holes, running parallel to each other.





Close-Up View of Upper Hali of Die From Rear of Press. The Scrap Discs Stamped from the Sheet are Carried Off on an Endless Belt Conveyor, Which Dumps Them into a Tote Box for Removal



Front View of Stamping Press in Operation. The Stamped Mats are Being Removed from the Die and Stacked on Skid Platforms to be Removed by Fork Truck to the Next Press

Today a relatively small part of Empire's floor space is devoted to the production of landing mats. As the steel is received in five-ton bundles on flat cars, it is lifted by overhead hoists and placed on a gravity roller conveyor leading up to the brake press. Two operators lift each sheet and place it on the press where the two longitudinal corrugations are formed. The sheet then passes over a roller conveyor and is put on a skid platform which is moved a short distance

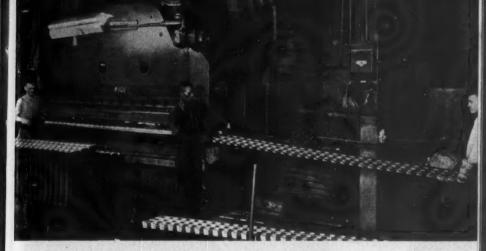
to the stamping press. Here the holes are punched in the sheet and their circumferences extruded. Simultaneously, the interlocking projections or "bayonets" are also stamped out.

A unique feature of this tooling layout is the floating ejector which loosens the mat from the lower die, enabling the operator to remove the stamped sheet quickly and easily. Disks which have been stamped from the sheet are carried off to a tote box on an endless belt conveyor.

February, 1944

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Whi dies whe shee oil k In erat in a gle the



The Third and Final Machine Operation, in which the Mat Ends are Trimmed, Radii are Cut on all Four Corners, a Trademark is Stamped on and "Bayonets" are Bent at Right Angles. Using a Combination Die, All of these Operations are Performed at One Stroke of the Press

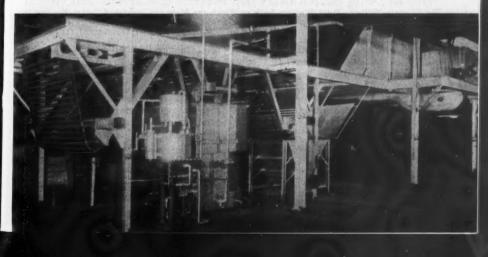
While the exceptionally high grade dies have an unusually long life even when used without lubrication, each sheet is coated with a light machine oil before it is placed in the press.

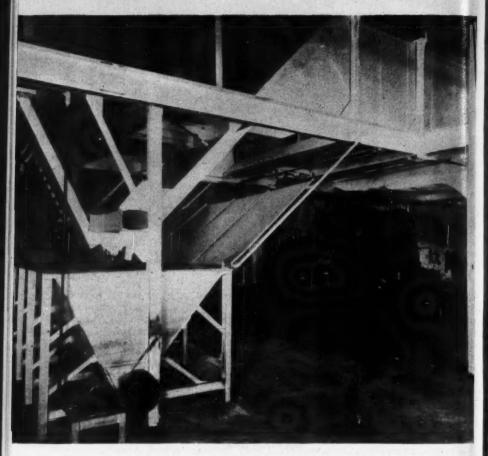
In the third and final machine operation, the stamped mats are placed in a Cincinnati press where, at a single stroke of the press, both ends of the mat are trimmed to specified length, radii are cut on all four corners to eliminate sharp corners, a trademark is stamped on, and all "bayonets" are bent downward at specified angles.

Automatic Finishing Line

Finishing the landing mat presented certain difficulties because of the severe conditions encountered by the

Overall View of Finishing Line, Showing Conveyor Chains, Degreaser, Paint Dipping Tank, and Baking Oven





The Sherwin-Williams Paint Dipping Tank in Which the Mats are Immersed Before Passing into Baking Oven Shown at the Right

mats in service. The paint used is required to be durable, heat and cold resistant and a shade in accordance with camouflage specifications. Furthermore, the rate at which the mats were to be fabricated indicated the need for a completely mechanized finishing line.

A conveyorized finishing line was devised to degrease, paint, bake and cool 425 mat sections per hour. The system operates as follows: After the

final fabricating operation, the mats are loaded from skid platforms by two operators onto hooks suspended from conveyor chains. The mats travel upward and then downward into a vapor degreaser where all stamping oil, grease, and dirt deposits are removed. The mats then pass through a forced drying zone after which they are immersed in a dip tank containing a Sherwin-Williams olive drab lustreless baking enamel.

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THE HOME of PERFEX Gages is the home of accuracy, because in this modernly designed and equipped plant accuracy has become a creed. A creed that only skilled men with years of making precision gages can adhere to.

It is by this adherence to accuracy that PERFEX has gained an envi-

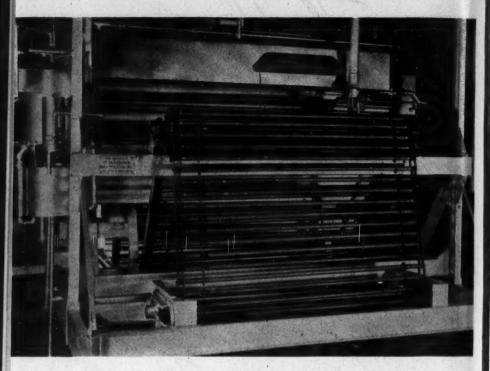
able reputation among manufacturers who demand the best in precision built gages.

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Loading End of Finishing Line, Showing Chain Conveyor and Vapor Degreaser

Adequate dispersion of pigment throughout the vehicle is maintained by screw agitators.

After passing over a drainboard, the mats are carried into the venting zone of a continuous type oven. This venting zone is equipped with large volume suction type fans which carry heated air from the baking zone proper and pass it over the work to commence primary evaporation of the volatiles in the paint. Thence the work is carried into the final baking zone where the finish is baked to the required degree of hardness. Accurate temperature control in this zone is provided through the use of proper control equipment.

Upon leaving the final baking zone, the mats pass through a heat seal chamber and from there directly into a cooling zone. Here cold air is passed over the work to reduce the temperature of the mats to a point where they can be handled for the unloading operation. At the unloading end of the system, the mats are lifted off the conveyor chains and placed on gravity type roller conveyors where they are inspected, bundled and loaded onto flat cars for delivery to the Army Air Forces.

One of the outstanding achievements by Empire Plow in producing landing field mats is the significant reduction in the number of machine operations from an average of 35-40 brother suppliers to 5 passes on 3 machines, resulting in an average output of 4250 mats every 10 hours. The

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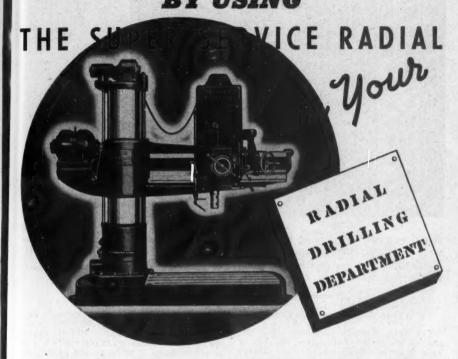
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MORE HOLES PER DOLLAR



The convenience and sound design of the SUPER SERVICE Radial Drilling Machine facilitate faster production, safer operation, and a long life. For your analysis of the SUPER SERVICE Radial's points of superiority send for Bulletin R-24 that explains, point by point, the construction and production advantages of this machine. In this bulletin you will learn how 36 speeds and 18 feeds are obtained with only 17 gears, why there is less manipulation and more time for drilling, the advantages of constant speed driving motor, and many more outstanding qualities of the SUPER SERVICE Radial Drilling Machine.



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THE CINCINNATI BICKFORD TOOL CO.

OAKLEY, CINCINNATI 9, OHIO



Finished Landing Mat Sections. Right-Angle "Bayonet-Lock" Projections on Edge of Mat Fit Into Slots in Edge of Adjacent Mat

than one-quarter of one per cent is the average. Finally, the highly mechanized finishing system, plus the development of quickdrying, durable baking enamel may be regarded as moving factors

in the production of millions of feet of essential landing field mats.

(Illustrations Courtesy the Sherwin-Williams Company)

sound engineering applied to the job was, of course, chiefly responsible.

Another feature is the unusually small loss because of rejects — less

Where Your Gas Has Gone

The next time you complain about the gas shortage remember this; a raid of 1,000 four-motor bombers over Berlin consumes roughly 800,000 gallons of gasoline on its mission. Engineers of Mack Trucks, Incorporated figure that if this

gas were hauled in oil trucks with each truck containing 4,000 gallons, 200 trucks would be required. Also, if your family car normally rolls up 12,000 miles a year and consumes 15 miles to the gallon, the gasoline used in a single bombing raid over Berlin would keep the old bus in fuel for 1,000 years.



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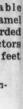
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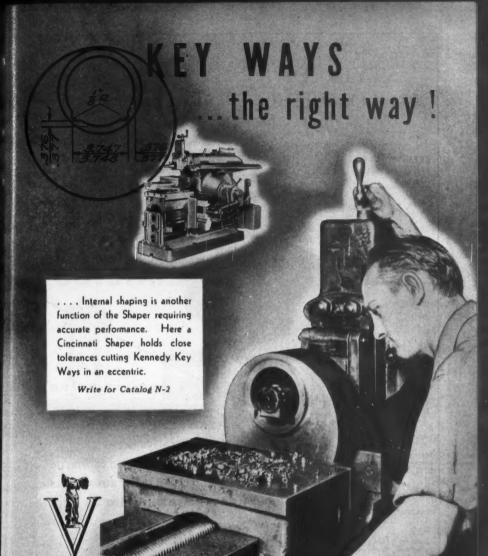








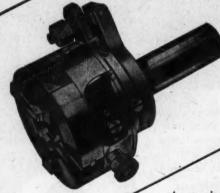




SHAPER CO.

CINCINNATI DHIO U.S.A. SHEARS

STYLE DS GEOMETRIC SELF-OPENING DIE HEAD



A precision tool for cutting accurate, smooth threads at high rates of speed—and economically.

Designed especially for Brown & Sharpe Automatics, it can be used on other automatics where the die head does not rotate, also on light hand screw machines.

Our catalogue will give you details.



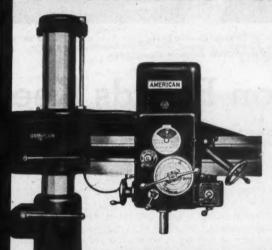
THE GEOMETRIC TOOL COMPANY

New Haven 15, Conn.



PHOTO COURTESY BELL AIRCRAFT CORP.

OUTSTANDING PERFORMERS



In aircraft plants from New Jersey to California, "American" Hole Wizard Radials are proving their reputation as outstanding performers on exacting jobs. On drilling, tapping, boring and facing they are hanging up records for quantity and quality production - records that are making it possible for American planes to overwhelm the Axis in every branch of aerial warfare.

THE AMERICAN TOOL WORKS CO.

CINCINNATI

RADIALS

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OHIO

THE AMERICAN TOOL WORKS CO



Fig. 1—"Utilization Board" in Use at General Electric Keeps Shop Executives Posted as to Status of Machines in Shop; Whether Employed, Idle, Under Repair, or Available for Work from Other Shops or Departments

Utilization Boards Keep Machines Busy

By H. M. ATWOOD

Planning and Wage Rate Department, Schenectady Works, General Electric Company

We know what the story is, but we need a means of quickly demonstrating that story to new supervisors and to many other people who are now interested in Machine Tools."

This was a frequent comment when the National Defense Program began to develop. The increase in interest in machine tools on the part of the government as shown both by visits of officials and by the increase of necessary reports to be filled out made this even more true. The important consideration here was not that foremen and supervisors did not have the information, but that they lacked a means of conveying that information in a concise, understandable manner to all concerned. What was needed was a centralized control system that would provide an accurate, up-to-the-minute picture of just how much each machine in each shop was being used 24 hours per day, along with an indication of the work expectancy for each individual machine. The hand-in-hand problems of

OOLS WORK TWO EXTRA SHIFTS PER WEEK

SUNOCO

increases tool life 35%...improves finish...at war plant

Machine tool men looking for ways to effect tool economies will find this case history valuable. It's about a plant producing armament parts, and how they increased tool life the equivalent of two extra 8-hour shifts in every 48-hour week.

Production was slowed because of trouble on machines using a competitive soluble cutting oil. Tool casualties ran high, finish of parts was inferior, emulsions showed a tendency toward rancidity.

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1944

Trouble stopped when they changed to Sunoco Emulsifying Cutting Oil upon the advice of a Sun Oil Engineer. Tool life increased 35%

... finish was noticeably finer ... rancidity stopped. And in addition, cutting oil costs were cut.

Now parts are speeded from the machines of this plant . . . and from hundreds of other plants that have found Sunoco Emulsifying Cutting Oil a spur to machine tool output. Sunoco's exceptional heat-absorbing quality and stability make it the answer for all metal cutting operations where a soluble oil is used.

For advice on cutting oil problems, write

SUN OIL COMPANY · Philodelphia 3, Pa. Sun Oil Company, Ltd., Teresto, Casada

SUNOCO > SUN INDUSTRIAL PRODUCTS HELPING INDUSTRY HELP AMERICA

Department A	Deilding but	Machine Shop	March 5, 1943
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42" L.4 S 48533	Ellis	Roberts	
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36* Pomi 28695	Ford	Pullmen	Isenburg
36° Pend 40504	Flaher		
36° Post 70303	Labote	Kelmighlen	Thomas
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30° Pend 47821	Hay	Coppe	A SHARLD MARKET
30° Amer. 40506	Lafgrette		Bunateed
30" Amer. 47825	Washington	Lof	Santabarbara
30" B-E 48902 27" Pend 48950	Latters	McGreth	St. Regis
24" Non. 48952	Inobl Insherk	Pagenes	
24" Aper. 47026	Seatt	Sulser Rinkbride	Bucket
- Maria - 1/440 - 1		KATESTAN	Dellong

Fig. 2-Photograph of Upper Part of Center Section of Board. The Colors Do Not Show, But There Are Several Blue, Brown, and Salmon-Colored Inserts on the Board

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material and employee availability were the two additional factors required to complete the picture.

We decided that a graphic means of portraying this picture to management and supervisory personnel would serve two purposes. First; it would enable management to determine whether any department had sufficient excess machine capacity to handle work for another overburdened department, and whether a machine or group of machines could be shifted from one shop to another. Second: it would preclude the possibility of misunderstanding among superintendents as to the actual need for taking a

machine from one shop and giving it to another. With the full facts clearly shown, no one could feel that he was being treated unfairly when work or machines were shifted in accordance with production

requirements.

As the first step in solving our problem, we decided on an indexing system involving the use of a board, sectionalized and hinged to fold in three parts, with each section slotted vertically to accommodate four two-inch-wide columns of narrow cardboard inserts. Each section of the board is nine inches wide by 18 inches high. The mechanical details

of making the board easy to read as well as easy to maintain resolved them-

selves quite simply.

The first column at the left side of each of the three sections contains the name, size, and G-E catalogue number of each individual machine tool. The second, third, and fourth columns show the name of the worker on each machine for the first, second, and third shifts. This information is typewritten on cardboard stock, perforated to provide the 4-inch inserts.

The next decision for making the board as graphic as possible was to use colors to provide other pertinent information on each machine. In col-

"A FILE OF QUALITY IS A JOY FOREVER," SAYS POP



"POP"—lovable character of the popular series of Nicholson cartoon advertisements—portrays the philosophy of the foreman who is always thinking of high efficiency and wise economy in shop practices.

He is convinced that good production begins with good tools; and that their proper use and proper care are equally important. In these he personifies the Nicholson viewpoint.

Nicholson and Black Diamond Files are made under the highest standards of design and quality 79 years of file-making experience has been able to attain. And so consistently does Nicholson maintain those standards that Twelve perfect files in every dozen is the sweeping Nicholson guarantee.

Following up the service of quality manufacture, through every means that appears practical, Nicholson endeavors to aid every purchaser in getting the most out of these famous files. One form of assistance is a book of 48 interesting, illustrated pages entitled—

"FILE FILOSOPHY"—Tens of thousands of copies of this book are in the hands of purchasing and production heads, shop foremen and key mechanics. Write for copies (how many?) for the interested men in your organization. FREE.

NICHOLSON FILE CO. • 48 Acorn Street, Providence 1, R. I., U. S. A.

NICHOLSON FILES

FOR EVERY PURPOSE



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The Model No. 150 Heavy Duty Drill is of the Universal Quick Change Type with extreme flexibility of speed and feed changes. It has ample capacity to drive 1½" diameter high speed twist drills. It is also adapted to boring, counterboring, facing, forming and tapping operations.

To give increased flexibility to the machine the vertical column assembly is of 2-piece design; lower frame which bolts to base arranged to carry standard plan table. The entire upper unit assembly with speed and feed train drives for rotating the spindles and for feeding spindles is mounted on the lower frame. Twelve quick changes of speed are provided.

Also built as single purpose type.

Further details are contained in a new attractive bulletin which is now available.

BAKER BROS., INC.

umn No. 1, which lists the machines, white is used to denote a standard machine in good condition and required for regular production. A machine listed on a yellow insert is available for transfer or sale. A machine listed on a pink insert means that it is restricted due to a special set-up or poor condition.

In the other three columns, listing personnel, the regular operator's name is typed on a white insert and placed opposite the machine he operates according to the shift he works. white insert with diagonal lines typed on it in any of the personnel columns indicates intermittent operation for the machine it covers. A brown insert indicates no operator and no work for a machine during the shift under which it is carried. A salmoncolored insert with an asterisk indicates an open shift for which an operator is required but not available. A blue insert with the operator's name typed on it indicates that he is a learner. A small red metal indicator superimposed on the right side of a personnel insert shows that the operator indicated is working a long shift. A machine under repair or being moved has black inserts opposite it in all three shift columns.

Building number, department name, work center, and date are shown on inserts at the top of each board. Machines are grouped according to G-E code number, which is indicated on a white insert in column 1, a green insert under each code number carrying the work-center (department or section) name.

With these details worked out we felt that we had the system needed to give us the up-to-the-minute picture on machine tool use that we were striving for. What really makes the system pay off is the use of it to provide a picture in the actual as well as the literal sense of the term.

Once a month each section of each board is photographed. Then 8 x 10

16" S

SOUTH BEND LATHES

GIVE SKILLED MANPOWER MORE PRODUCING POWER

To give our fighting forces the increased striking power of more and better weapons, Industry's skilled manpower must have

the increased producing power of fast, accurate tools.

South Bend Lathes squarely meet this requirement. Their rigidity and wide range of spindle speeds permit taking full advantage of the higher cutting speeds of carbide and diamond tipped tools. Their precision makes it possible to finish turn and bore with such accuracy that subsequent grinding and honing operations can often be eliminated.

South Bend Engine Lathes and Toolroom Lathes are made in 5 sizes—9" to 16" swings. The Turret Lathes are made in 2 sizes. Write for catalog. South Bend Lathe Works, South Bend, Indiana.



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non-glossy prints are distributed to the respective superintendents, assistant superintendents, general foremen, and planners concerned in each shop. Thus each of these supervisors and Fig. 3 — Each General Foreman Checks the Status of the Machines in H is Department Daily and Changes the Tickets on the Board Accordingly, Thus Maintaining an Accurate Visible Record of His Department

executives is given a quick-reference utilization chart on every machine and man under his jurisdiction. This expediency not only saves time that otherwise would be required in making up and maintaining a large num-

ber of boards, but it also provides an easily kept permanent record of machine tool utilization in any of our shops at any period. A copy of all the photos is kept on file in the office of the

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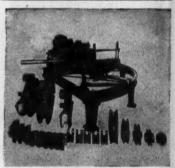
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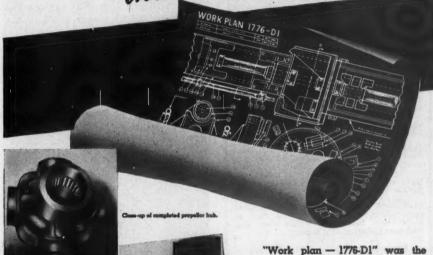


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THE PIECE OF PAPER

that broke a bottlenech



"Work plan — 1776-D1" was the appropriate nomenclature for the machine and broaches which today are making production figures unbelieveable a few short months ago. They are the chief bottleneck breakers in putting out spline propeller hubs for a new type aircraft propeller. Made of especially hard steel.

these new propellers could be turned out in mass production with the precision tolerances desired only by broaching. Exact production figures are a secret but hub splining is no longer the bottleneck.



Tool Company

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In War, as in Peace...

CERRO ALLOYS

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CERROMATRIX (Melting Temp. 250° F.) For securing punch and die parts, anchoring machine parts without expensive drive fits, short run forming dies and other metal-working applications.

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40 WALL ST.

NEW YORK CITY

works manager, for reference.

The master boards are controlled by the general foreman in the various shops, and they are responsible for keeping the boards accurate by dayto-day check-ups.

The "utilization board" system has more than paid its way since it has



Fig. 4—Once a Month Each Section of Each Board is Photographed and Prints are Distributed to the Executives Concerned, Thus Providing Each with a Literal Picture of the Plant Operations and Giving Him an Opportunity to Plan His Production Accordingly

been in use. Soon after it was initiated, for example, the acceptance of an order for the manufacture of a large quantity of apparatus necessitated additional lathe capacity in the shop which ordinarily handles that type of work. The central group of utilization board photos showed that another shop had adequate third shift

ACCURATE



by ous for aynas

f

t

OBLIQUE

Grinding grooves in rolls for tube forming machine, with Dumore mounted on compound of engine lathe, using special bracket of simple design.

VERTICAL

Dumore No. 5 mounted vertically in a Bridgeport Universal Miller, grinding the contours of a motor lamination die. For vertical mounting, the quill is provided with a special oiling system to assure adequate lubrication of the top bearing.



OVERHEAD

Ingenious mounting of Dumore on double overarm of Milwaukee Miller, permits free use of table for attaching indexing fixture in grinding teeth of gear hob.

Amazing versatility of the Dumore together with its high precision convert any available machine tool into a special purpose precision grinder for a wide variety of operations. Catalog 42 is full of helpful suggestions and application data. Get a copy; write today!

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Write for Literature

ABER ENGINEERING WORKS INC.

Waterford, Wis.

lathe capacity to handle the job, and the order was filled on schedule by doing the lathe work on these machines on the third shift. Here was a case where an 18 per cent improvement in machine tool utilization was achieved.

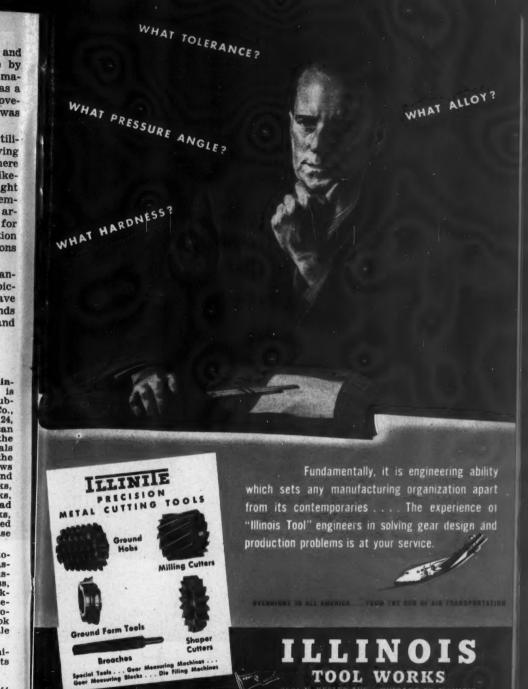
Comparable improvements in utilization have been made by moving machines in a number of cases where such moves were found justified. Likewise, shops which otherwise might have had some of their machines temporarily idle have been able to arrange in advance to handle work for other shops where the utilization boards showed the opposite conditions to be the case.

So there is a new slant to the ancient Chinese proverb that "one picture is worth 10,000 words." We have found that it is also worth thousands of extra productive hours for men and machines.

"Modern Materials Handling Machinery Applied to American Industry" is the title of a plastic-bound book published by The Yale & Towne Mfg. Co., Philadelphia Division, Philadelphia 24, Pa. Prepared as an aid to American industry and management in making the fullest practical use of modern materials handling machinery, this book, in the first several pages, explains and shows by means of line drawings, how skids and pallets, hand lift trucks, power trucks, low-lift and high-lift platform trucks, high-lift fork trucks, trailer trains, load carriers, ram trucks, crane trucks, hoists, and other equipment can be used to cut manufacturing costs and increase production.

Following this is a series of photographs representative of the many classifications of large and small industries — metal, transportation, process, warehousing, and so on—that are making effective use of Yale & Towne materials handling machinery to speed production. The last few pages of the book include concise information on the Yale line.

Copy of book is available to mechanical executives who address their requests on their company letterheads.

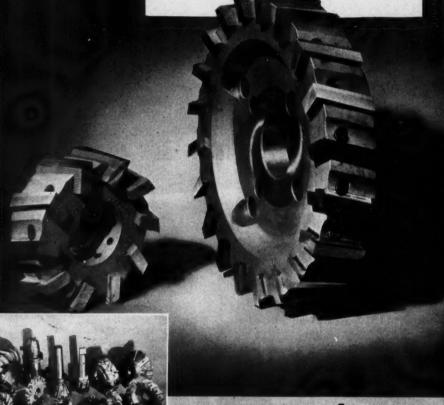


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	8110X	10"	18	2-14"		60.00
	8112X	12"	20	2-1/2"		78.00



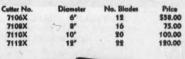
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"A great waste of time which we thought unavoidable was continually going on. Now we have your "MAGNI-RAY" in various convenient positions in the shop and it is a pleasure to see the men making use of them, which has helped to accustom them to do better work, more neatness in precision work and saving in time. The MAGNI-RAY will show anything up clearly in even the darkest parts of our shop.

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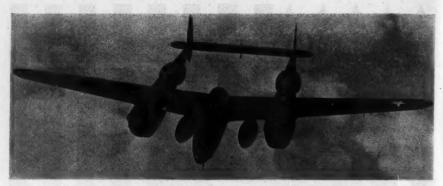
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Lockheed Lightning P-38 Equipped with Droppable Auxiliary Fuel Tanks. The Auxiliary Tanks
Double the Cruising Range of this Long-Range Fighter

"Tear Drops" for Tojo

A modern application of the welding principle at Lockheed is expediting the defeat of Japan

A T one of the branch plants of the Lockheed Aircraft Corporation, near Los Angeles, tear drops for Tojo, Hitler and Company are being plucked off a conveyor line, packed into crates, and rushed off to the fighting fronts at a rate of one every 4½ minutes.

These "tear drops," which are 10 feet long and 27 inches in diameter at their widest point, are the streamlined, laminar-flow drop tanks which enable Lockheed Lightning P-38's, Vega Ventura bombers and other American aircraft to carry the aerial war right into the backyard of the enemy.

In production 90 days after the order was placed by the United States Army Air Forces (although at that time there was not even a tank design on the Lockheed drafting boards), the remarkable output of this continuously-moving conveyor line was made possible through the application of some of the most ingenious spot, roll, and seam-welding equipment yet de-

vised. It is believed that two of these welders are the first of their type constructed in this country.

Each tank, 90 pounds in weight when empty, holds 165 gallons of gasoline and weighs 1,000 pounds when filled. Two of these tanks are added to the equipment of the plane, clamped with releasable brackets beneath the wings. When starting on a long assignment, gasoline is fed to the motors from these auxiliary tanks and then, if an emergency arises, the tanks can be dropped by releasing a lever.

Although two such tanks will supply enough fuel to approximately double the normal range of a Lockheed Lightning, the aerodynamics problems have so skillfully been overcome that the two tanks, when full, reduce the speed of the plane only four per cent at top speed.

At the time the Army made its urgent request for a tank that would Seamwelding Adapter Assembly of Filler Well to Left Hand "Skin" of 165-Gallon Fuel Tank. The Special Series Welder is Unusual in that the Weld is Made on a Double - Contoured Surface Having a Rise of ¾ Inch in 90 Degrees of Rotation

cost less, use no critical material and be adaptable to a much higher rate of production, an aluminum tank was being manufactured for Lockheed by a nearby sub - contractor. The first 2,000 of these had cost the Government \$678 apiece. The Lockheed Company was given three months to go into production on a new type of tank that would meet the specifications, and although at that time no such

tank had even been designed, the assignment was met on schedule.

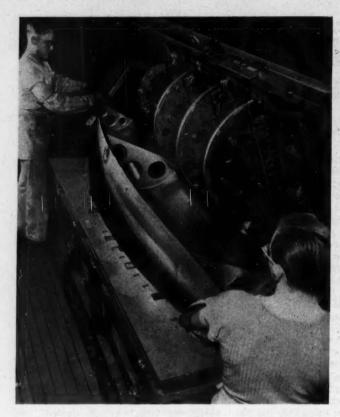
The task of designing a tank to meet the requirements was given to Chief Production Engineer Harold Harrison and in due time, after ex-



periments with various designs, including hours of wind tunnel and static vibration tests, he produced a tank made of 1010 body steel, 0.024 inch thick, which costs less than \$100.

To the manufacturing department

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Welding Bulkheads in Haif of "Tear Drop" Fuel Tank, Using Spe-cial Lockheed Semi-Automatic Welding Machine. When the Automatic Welding Machine. When the Hinged Cover is Let Down and Current Applied, Roller Spot Welds are Motor-Driven Around the Arc Until All Welds have been Completed. The Welding Time for Four Bulkheads is One Minute

One Minute

130 tanks, or better than one every four minutes. The average output for all three shifts is a tank every 41/2 minutes.

To crystallize the project, a manufacturing layout was developed and built around a plan for using a continuous convevor where the assemblv operations could be perform-

ed on the tank while it was in transit. The equipment consists of an overhead conveyor from which cradles are suspended, each cradle holding one tank and the complete conveyor holding 36

was given the job of devising a conveyor system for a production of 130 tanks a day. In operation, the system more than doubles that figure, setting an eight-hour shift record of

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No. 141 may be had without grinder or with grinder for removing flash. Has 6 point heat control, one for annealing weld.

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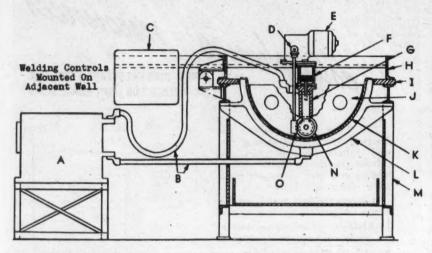
amperes (10-200 amperes).

- High-frequency arc stabilisation permits operator to strike arc quickly and hold it steady at settings as low as 10 amperes.
- 2. Movable core provides very fine stepless current adjustment.
- 3. Double range current adjustment from 10 to 70 amperes for welding special alloys.
- Preset indicator permits adjusting for desired welding current before starting.
- 5. Switch-in-handle electrode holder (included in accessories) provides pilot control of the high-frequency stabiliser.

et et et cradles. The welding and assembly machines and tools are located at various stations along the conveyor line, in the sequence in which the operations are performed.

The tanks are made in halves, each

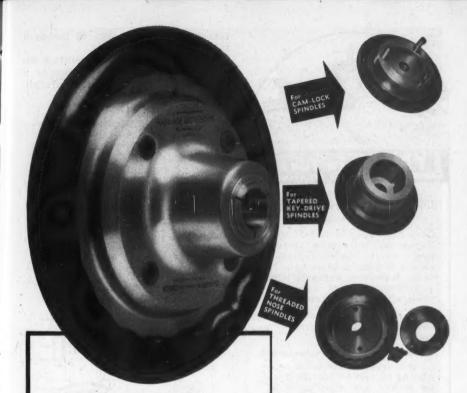
side of each is completely coated with a special zinc chromate primer as a protection against corrosion. The shells are then placed on a second conveyor, right and left shells being alternated, which carries them



Sectional View of Lockheed Semi-Automatic Welding Machine Used to Spot-Weld Bulkheads in Place. A—Welding Transformer. B—Water-Cooled Welding Cables. C—Counterweight. D—Bevel Gears. E—Driving Motor Reducer. F—Air Cylinder. G—Guide and Current-Carrying Bushing. H—Hinged Top. I—Table Plate. J—Tank Bulkhead (Bulkhead Locating Plates are Attached to the Hinged Top). K—Tank Skin. L—Copper Casting. M—Table. N—Welding Wheel. O—Worm Gears.

half being blanked and drawn to shape in a huge hydro-press. After entering the assembling department, the halves leave the first conveyor line to enter a slushing booth where the inthrough the various processing stations and finally to the platform where they are placed in a pre-fabricated crate for shipping. The assembly conveyor is 475 feet long and, under the





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For converting engine lathes or replacing turrets on standard turret lathes. Fits lathes up to 24" swing, 91/2" hexagon head, 10" travel, easy-action large pilot wheel, 6 positions, automatic indexing.

Cut-off Cross Slide available with back and front adjustable tool posts.

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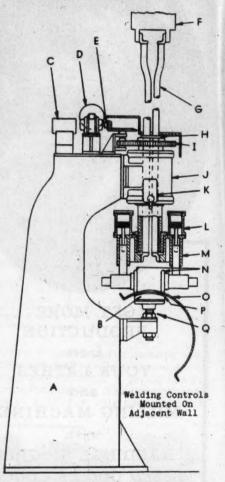
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220 Elroy St. Minneapolis 8, Minn. present schedule, moves 43 inches a minute.

The first assembling operation on the tank is the torch welding of a sump plug flange to the left hand shell.



Assembly Drawing of Filler Well Seamwelder. Assembly Drawing of Filler Well Seamwelder.

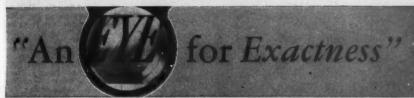
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Seamwelding Pan Half to Tank Half, Using Portable Seamwelder Designed by Lockheed. The Welder is Supported by a Chicago Pneumatic Counterbalancer and the Welding is Done While the Tank-Half is on the Moving Conveyor. The Welding Wheels Rotate in the Opposite Direction to the Movement of the Conveyor; Thus the Welder Actually Travels Less than 18 Inches During the Welding Operation

Next, the filler well adapter assembly is seamwelded to the left hand shell, using a welding machine designed by Lockheed engineers. The machine is similar to conventional series seam welders such as those used to weld brass discs to shell cases, but the design is somewhat unusual in that the weld is made on a double-contoured surface having a rise of three-quarters inch in 90 degrees of rotation.

The machine is equipped with two air cylinders to which the shaft housings, welding shafts and welding wheels are connected. The two cylinders and welding units are electrically insulated from each other and bolted to a casting which rotates on a hollow shaft, the shaft being mounted vertically. The shaft is ac-

tually a tube, providing protection for the water-cooled welding cables which connect the two sides of the transformer to the cast copper shaft. The circular copper alloy short circuiting bar, the upper face of which is contoured to fit the inside of the tank, is mounted horizontally below the two welding wheels.

When the two wheels contact the tank surface, the welding circuit is closed by the short circuiting bar, which is horizontal and can be seen just below the "skin." Since the welding current flows through the



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February, 1944

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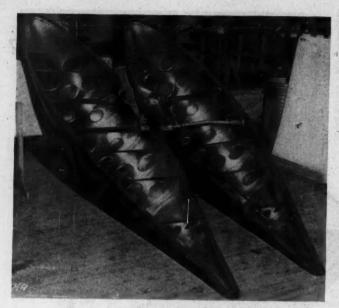
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ling ally ach to a rolow bertiacfor nich ns-The ing onnk, wo the is

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MODERN MACHINE SHOP

163



Two Half Shells Ready for Mating to Form a 165-Gallon Droppable Fuel Tank. These Tanks are Now Being Turned Out by Lockheed at a Rate of One in every 4½ Minutes. Two Such Tanks will virtually Double the Range of a Lockheed Lightning P-38 Fighter, Which — E ve n Without this Auxiliary Fuel Capacity—is the Longest-Range American-Built Fighter

sheet at two points, two welds are made simultaneously and the 360 degree circle of welding is completed in approximately 185 degrees of rotation of the upper heads.

After this operation has been completed, seven bulkheads are welded to each shell—right and left hand. This is done in two special semi-automatic welding machines—also designed by Lockheed engineers—the first of which welds three bulkheads in place and the second, the remaining four.

The half shell is placed in the ma-

chine, where it is supported at the bulkhead stations by copper alloy electrode bars which have been machined to an exact fit for the outside contour

of the pressed steel tank section. Hinged to the fixture is a huge frame, or cover, which carries positioners for the four bulkheads, each positioner serving as a support for a roll-spot welding unit which is designed to rotate about the longitudinal axis of the tank.

Each welding unit consists of a welding wheel and shaft, shaft housing, guide casting, 3 x %-inch stroke air cylinder, a 1/12 h.p. driving motor, reducing gear box, and the necessary gear train to drive the welding wheel



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Seamwelding the Two
Halves of a Droppoble Fuel Tank Together, Using a National Electric Welding Machine. This
Seamwelding Operation is Performed at a
Rate of 50 Inches a
Minute, or a Total of
Four Minutes Per
Tank

quarters inch center to center. Welding time is one minute on each of the two machines, another minute being devoted to loading and unloading in each.

At this point the half shells are

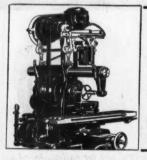
placed on cradles on the moving conveyor, the cradles being spaced 18 inches apart. While in transit, flanged gussets and other parts are located and spot welded to the stressed bulkheads by the use of gun welders which are mounted on monorails so that the operators can follow the tanks along the floor until the several welding jobs have been completed.

The two halves of the pan are seamwelded to the halves of the tank with a portable seam welder designed and

shaft. The sequence panel and welding transformer are outside the fabricating jig proper.

The roller spot welds are controlled by units consisting of a Westinghouse non-synchronous pulsation weld timer panel with a Weld-o-trol Electronic Contactor. These timers were modified slightly by Lockheed to secure the desired sequence of operation.

Except in the two center bulkheads, where the welds are spaced one-half inch apart, the welds are spaced three-



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The W. O. Barnes Company is glad to co-operate with the War Freduction Board in promoting tool conservation: Barnes factory trained service men are available in helping to solve blads problems. An indispensable help for cutting over eighty different types of metal. Use BARNES blades for increased production. Write W. O. BARNES CO., INC., 1303 Terminal Ave., Detroit (14), Michigan

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"Highest grade materials ...long experience in tap design ... controlled accuracy of manufacture—these qualities combine in WOOD & SPENCER Taps to offer you the ultimate in dependable,

For your tapping operations, specify WOOD & SPENCER. Write for our latest catalog."

precision tapping.



built by Lockheed. This welder is supported by a Chicago Pneumatic Counterbalancer of 175 pounds capacity. and the welding is done while the half tank is on the moving conveyor. Since the linear travel of the wheels on the welder is approximately the same as that of the conveyor, the wheels were designed to rotate in the opposite direction to the movement of the conveyor. Thus the welder actually moves



Marjorie Coon, a Certified Welder on the Swing Shift at Lockheed, Torchwelds the Tail Plug Flange in Position in a Droppable Fuel Tank

less than 18 inches during the welding operation.

Various small parts are anchored in place, station by station, until the tank has passed through nine separate welding stations. Meanwhile, fuel lines and vents are gas- and tackwelded in place and the attachment hooks are bolted on.

An inspection is made at this point to make sure that there are no loose parts, then the right and left half shells are mated and clamped together, using prepunched holes in the fo

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Using Hannifin Pressure Regulating Valves with air operated equipment provides the correct working pressure for each unit. Often working pressure is considerably less than full line pressure and makes for easier and safer handling, and reduces compressed air consumption. Hannifin Pressure Regulating Valves are built to deliver accurate, dependable control, without maintenance. The exclusive piston type design gives sensitive, accurate control of working pressures—adjustable over the entire working range to provide any reduced

operating pressure desired. Piston type design, with long valve stem travel, gives large volumetric capacity, meeting varying operating needs with minimum restriction to flow. Simple, dependable construction throughout means long life without maintenance.

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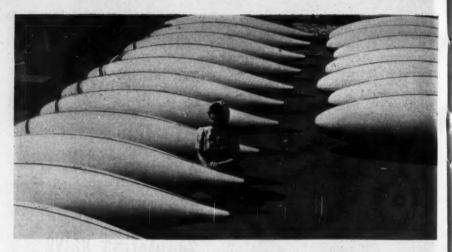
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Tear Drops for Tolo. The Size of the 165-Gallon Tank can be Estimated in Comparison with Alice Goodrich—One of Lockheed's Women War Workers. Weighing 90 Pounds Empty, the Tank Weighs 1,000 Pounds When Full, Yet Retards the Speed of a Lockheed Lightning P-38 only 4 Per Cent

standing seam for correlating the halves. The parts are tack-welded together by the use of a gun welder, after which the tank is taken off the line and placed in a special cradle for passing through the National Seamwelder. The seamwelding completes the mating operation and is done at a rate of 60 inches a minute, or a total of four minutes per tank.

Any excess material on the standing seam is now trimmed off with an electric shear, the tail plug flange is torch-welded in place, and the tank is placed back on the conveyor. Air is pumped into the tank under pressure and the exterior is covered with a solution of soapy water so that any leaks which may be present will immediately betray themselves by the formation of bubbles. Leaks are immediately repaired.

The tank is now ready for the slushing table, which holds two tanks, one on each side. Into each tank are poured 30 gallons of special non-inflammable zinc chromate primer, then the table is rotated so that the fluid





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will flow over every portion of the interior of the tank. The fluid is then poured out and the tank is dried out with a hot air hose.

After being given a final pressure test, the permanent tail plug is screwed in place and the tank is placed on the second or process conveyor which carries it, in turn, through a hot Turco bath cleaning solution, a cold water rinse, a drying oven, and a paint booth where two primer coats and a final camouflage paint coat are applied.

This same conveyor then carries the tank up and through a window and out into the shipping building over a platform where a decal is added that shows the manufacturer's name, tank capacity, and so on, and where anti-sabotage seals are placed over all openings. From here the line moves to a point where a protective coating of Paralketone is applied by spray gun, and then to the shipping building for crating.

Once anchored in position under the wing of a P-38, a Vega Ventura, a Vega PV-1 or other American plane, the tank—which can be dropped at the will of the pilot—helps these fast, hard-hitting aircraft to carry the war right onto the home grounds of the nation's enemies. Tear drops for Tojo.

USS Stock List and Reference Book No. 1. Well illustrated and packed with up-to-the-minute information needed by steel users, a new stock list and reference book of USS steels, steel products, tools, equipment, and machinery is announced by United States Steel Supply Co., 1319 Wabansia Ave., P. O. Box M.M., Chicago 90, Ill. Supplementing the listings of USS products is a series of reference tables and other data.

Although it contains a vast amount of material, the book is easy to use because of a convenient index along the margin. In addition, the book is bound so that pages lie flat when turned.

so that pages lie flat when turned. Copies will be sent free to executives addressing requests on their company letterheads.

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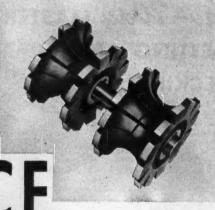
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An Approach to Functional Design Standards

By ROGER W. BOLZ, M. E.
National Carbon Company, Incorporated

ALTHOUGH consideration must be allowed for the great advances made in recent years in the field of design as applied to machines, tools, and metal products, the evidence indicates that there is still plenty of opportunity for improvement. Probably one of the most important factors that could be applied for the elimination of this deficiency is the development of comprehensive functional design standards among designers and engineers.

Accepting this premise, the first point to be taken into account is form. The term "form" covers a wide field, reference in the present case being made to general shape or contour of parts involved in the design of the product. Adherence to the simplest geometric forms possible when designing is conducive to easy reproduction, regardless whether the parts are to be produced by die forming, forging, casting, or welding.

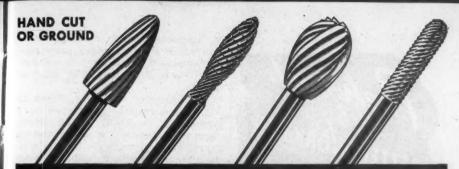
In designing a product or machine first consideration must be given, of course, to engineering design, but the designer should never lose sight of the item of cost. This involves the machining and finishing processes; thus each component part should be designed so as to require a minimum of finishing and consequently of tooling,

otherwise the cost of the completed product may be such as to make the merchandising of the product prohibitive. Thus it is well to keep the principles of simple form in sight at all times. Many a good design has been discarded due to excessive cost of production which, if redesigned to reduce to its simplest form of construction, would have proved practicable.

The aim of the designer should be to develop a design which, while capable of producing the desired results, will be composed of the fewest number of parts possible. Each part should be the optimum in design simplicity, yet capable of delivering the necessary performance and at the same time presenting a symmetrical appearance.

A knowledge of materials and their respective properties is of utmost importance at this point, inasmuch as these factors may determine the success of the design. To one who is posted on these points an opportunity is often presented for the substitution of materials which may both improve the quality and lower the unit costs.

No individual part, no matter how simple, should be overlooked in the search for simplification and reduction of costs. In many cases even a comparatively simple piece can be made



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busy industrial plant. Machines and equipment MUST be kept running. Time lost by breakdowns means lost production. Good tools are as important as the mechanical skill of the man using them. These men PREFER the VICTOR high-speed steel "MOLY" Type* Hack Saw Blade for fast, accurate cutting; and the Unbreakable Special Flexible Blade for tough sawing in inconvenient places.

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of assembled parts, resulting in a unit which will be cheaper, more rapidly produced, requiring less machining-if any, and possibly of superior quality.

For example; the piece shown in Fig. 1 was originally designed as a completely machined fitting which required a number of special set-up operations and tooling. By the substitution of standard seamless colddrawn SAE 1010 or SAE 1020 steel tubing for the outer shell and SAE

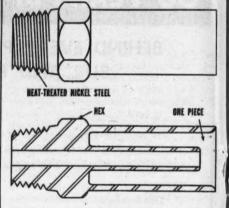


Fig. 1-Fitting Designed to Be Machined from a

X-4130 for the inner stem piece, as indicated in Fig. 2, the difficult trepanning and deep drilling operations were supplanted by a cheap kick press operation and copper brazing assembly operation.

As indicated in the drawings, the threaded end of the unit required a high grade of heat treated nickel steel. By adopting the redesign, several important advantages were achieved which had not been possible before, over and above the reduction in unit manufacturing cost.

The threaded portion could be properly heat treated without affecting the outer shell, thereby affording good crimping or swedging properties for

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MODERN MACHINE SHOP

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assembly purposes. During the process the inner stem attained a relatively high hardness, guaranteeing against crushing during assembly or

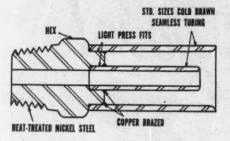


Fig. 2 — Fitting Redesigned for Manufacture from a Machined Piece and Two Pieces of Tubing, Saving Critical Materials and Reducing Production Time

afterward. Lastly, the quantity of nickel alloy required per unit was substantially reduced, both lowering the unit cost and conserving valuable metal.

When considering designing a unit to be composed of assembled parts. careful judgment must be exercised to assure easy assembly and, in some cases, ultimate disassembly. The possibilities for the combination of several component machine parts into a subassembly, where such procedure will afford opportunities for greater production, should also be taken into consideration. It is possible that, by this method, the number of pieces to be handled in the final assembly can be reduced, not only saving time on the final operation, but also permitting the reduction of accumulated errors to the minimum.

This brings us to the subject of allowances and tolerances. Approved commercial standards have been set covering allowances and tolerances, also fits and limits, yet there are innumerable cases where the standards are neither suitable nor practical. This, then, is where the designer must call upon his judgment. Fits

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must be arrived at which allow the maximum possible leeway in the manufacture of each individual part in order to keep tooling costs at the minimum and production at the maximum, yet maximum assembly conditions must be maintained to eliminate selective assembly and reduce rejections, rework, and scrap.

A common example—and one which occurs frequently—is the assembly of mating parts which are manufactured at different sources, the assembling being accomplished by through bolt-

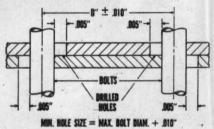


Fig. 3—Piece Designed with Tolerance on Hole Size to Produce Minimum Clearance in Each Hole, Over Maximum Bolt Diameter, Equal to Tolerance Between Hole Centers

ing. In this case, as indicated in Fig 3, by setting a tolerance on the hole size which will provide a minimum clearance in each hole, over the maximum bolt diameter, equal to the tolerance between the hole centers, the designer can guarantee good assembly conditions.

Should one set of holes be tapped as shown in Fig. 4, however, all the clearance is taken in the plain holes; thus the amount of clearance in these holes would be twice the amount of tolerance between the hole centers. The hole size can then be set at the nearest standard diameter equal to or just over the calculated diameter. Thus, through his design, and regardless of the source of manufacture, with proper allowances and tolerances the designer can be confident of effi-

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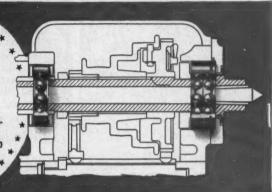
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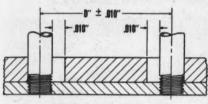
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MODERN MACHINE SHOP

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cient assembly and complete interchangeability.

To this end, standardization of methods, materials, designs, tooling,



MIN. HOLE SIZE = MAX. BOLT DIAM. + .020"

Fig. 4—Where One Set of Holes is Tapped, All Clearance Should be Taken in the Plain Holes, Setting Clearance in Plain Holes at Twice the Tolerance Between the Hole Centers

fits, limits, and so on will prove a valuable asset. In any but the very smallest manufacturing organization early standardization will result in important advantages in production and costs. These advantages will usually become evident in a decrease in the amount of designing and drafting necessary, elimination of unnecessary stocks of material, decreased tool designing and tool building, decreased unit assembly time, and increased advantages in interchangeability.

Good examples will be found in the operation and maintenance of equipment where frequent changes in the design of the product necessitate corresponding changes in tooling, fittings, and adapters. Adherence to definite standards in the design of interchangeable equipment will go a long way toward speeding up the change-overs and subsequent production.

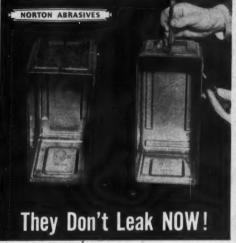
The establishment and maintenance of a company Standards Book will, with constant research and development contributions, aid materially in stamping out antiquated and costly rule-of-thumb type of engineering. The effect will be to develop a sound and uniform approach to the problems



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Some of the metal field cases for 50-caliber ammunition were not standing up to the pressure test when submerged in water. Try as they would, the makers couldn't get rid of this "headache" which occurred in a sufficient number of cases to make the whole operation slow and worrisome.

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Photos, Courtesy of The Belmont Casket Manufacturing Company, Columbus, Ohio.



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IDIVISION OF NORTON COMPANY

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common to all factory departments.

Unfamiliarity with sound every-day shop practices will often betray itself in product designs which are lacking in detail. This lack often forces the manufacturer or processes to draw upon his experience or assume the deficiencies in order to finish the job. thus fostering unending difficulties in assembling, increased initial cost of production, poor efficiency in operation, and increased difficulties in upkeep and servicing.

A careful analysis of this situation will show that the value of a Standards Book increases in direct proportion to the attention given to it as to detail, comprehensiveness, and completeness. Spasmodic or periodic attention will be reflected in little or no concrete value.

Functional simplicity and standardization in design, taking into consideration the problems of (1) the amount of machining or processing required, (2) simplicity and economy in tooling for machining operations. (3) ease and economy in assembling, and (4) simplicity of servicing, can thus effectively result in a product having superior design characteristics. closely adapted material requirement and production facilities, and last, but not least, lower total costs.

The present demand for increased production in the face of material shortages, labor shortages, and inadequate manufacturing capacities stresses the need for such a program' more forcefully than is possible with words. Results obtained where such a program has been put into effect point the way to a new era in design.



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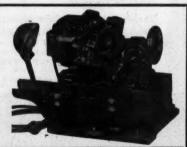


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America's war plants are switching to new, powerful Speedy Air Vises! From a single vise... to an installation of fifty... they are saving time, effort and labor costs! Air operated, foot controlled—both hands are left free for more rapid drilling, tapping, light milling, assembly, etc. \$24

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W. R. BROWN CORP., 5725 ARMITAGE AVE., CHICAGO 39, ILL.

METAL CUTTING INDUSTRY HAILS TANTUNG

Miracle Metal Establishes New and **Amazina Records**

TANTUNG

New Non-Ferrous Cast Alloy Replaces High-Speed Steel Tools is Proving to be of **Tremendous Advantage**

to the Metal Cutting

Industry.

Tantung is the trade-name of the most advanced non-ferrous cast alloy for metal cutting. It was developed to "Fill The Gap" between conventional High-Speed Steel Tools and Cemented Carbides—a long-felt need in the metal cutting field. Scientists of the Fansteel Metallurgical Corporation, an affiliate of the Vascoloy-Ramet Corporation, senent years of greegarch and expregnent in amnate of the vascooly-camber corporators, spent years of research and experiment in perfecting Tantung. Performance records developed under all shop conditions establish Tantung as the most outstanding contribution to the metal cutting industry since the advent of Cemented Carbides.

CUTS ANY METAL THAT CAN BE MACHINED

More than a million Tantung tools have been used by the trade for practically all machining operations. Tantung cuts rolled, forged or cast steel, annealed or heat treated, cast iron, aluminum, brass, copper, bronze or any material that can be machined.

Tantung has an exceptionally high transverse rupture strength. It is tough and shock resistant. Hardness, to be a practical gauge of wear resistance, must be measured at working temperature. It is the high red hardness of Tantung, higher than any high-

speed steel, that enables it to work so efficiently under heavier loads. This virtue, coupled with Tantung's peculiarly low co-fficient of iriction, contributes to the emarkably long life between grinds. Tantung far surpasses all performance records of high-speed steel for pieces produced per grind. Tantung can be operated at far greater speeds than are recommended for high-speed

speeds than are recommended for ingn-speed steel. Tantung permits heavier cuts and heavier feeds. It is an excellent finishing tool and on most materials the finishing cut can be taken at at least one speed faster than the roughing cut.

TANTUNG IS SELF-LUBRICATING

Tantung's basic formula includes tantalum carbide. Tantalum carbide not only imparts a self-lubricating action to Tantung tools, but in combination with other materials makes possible the dense structure that is responsible for the keen, durable cutting edge. "Cratering" or "chip wear" is reduced

NO SPECIAL TRAINING OF OPERATORS REQUIRED

Standard Tantung tools fit all standard tool posts and holders, and personnel trained to high-speed tool practices can readily employ the same techniques to produce vastly superior results with Tantung tools.

(To insure efficient cutting under vari-ous speeds and with different tools, we furnish Wall Charts and Pocket charts to guide the workman in proper tool selection. These are furnished free upon request regardless of whether our tools are used.)

HOW TANTUNG "FILLS THE GAP"

Tantung is not recommended as a sub-stitute for Cemented Carbide tools; it should be specified where Cemented Carbides cannot De specified where Cemented Carbides cannot be used effectively. In the jobbing shop, maintenance departments, and smaller pro-duction shops where a great variety of work is handled, the versatility of Tantung recom-mends its use from the point of tool econ-omy. Bronze, cast iron, aluminum, plastics and steels can all be machined by the same tools with actual cutting time substantially reduced.

HOW TO USE OLD MACHINES TO MAXIMUM CAPACITY

Old machines very often do not have sufficient speed for Carbide and, in combina-tion with vibration and worn gears, Carbides cannot be used effectively. Tantung enables these machines to be used to capacity. This

is especially true with small diameter work. Often-times Tantung and carbide-Tantung for the small diameter and Carbide for the large diameter—are teamed together in the same operation with excellent results.

HEAT TREATED ALLOYS MACHINED WITHOUT DIFFICULTY

The ever increasing use of heat treated alloys ordinarily presents machining difficulties that Tantung successfully overcomes. Machining these alloys requires sharp side and top rake angles that cause chipping of the Cemented Carbide tools. The greater toughness of Tantung supports the cutting edge at these angles and the tantalum carbide content aids the sliding of the chip causing less chip pressure.

COMPARATIVE PERFORMANCES OF TANTUNG TOOLS AND HIGH-SPEED STEEL TOOLS

MACHINERY MANUFACTURER REPORTS: "Using a 20-year old boring machine on 18-8 stainless steel with welded joints, High-Speed Steel and Carbides failed miserably. Tantung tool bit completed the job in three hours with mirror-like finish."

A PUMP MANUFACTURER AD-VISES: "Tantung is truly the Miracle Metal In machining Navy Bronse on a Kearney & Trecker milling machine, Tantung cutter performed a miracle. Tantung produced 26,250 pieces per grind against 3750 for high-speed steel cutter."

A LARGE FORGE COMPANY WRITES: "Ran Tantung at double the speed used for high-speed steel. Tantung produced four times the amount of cutting as against high-speed steel operation—machining scaly, nickel, chrome forging, Brinell 321; on a 42" axle latthe."

Tantung tools operate efficiently at speeds not possible with high-speed steel tools. On an average, speeds and feeds can be increased 50% to 200% over high-speed steel according to variables occurring in materials and machines. More detailed performance data more specific information regarding Tantung "The Miracle Metal" is interestingly graphed and illustrated in the new Tantung catalog. For copies of Catalog, Wall Charta, Pocket Charta, address: Vascoby-Ramet Corporation, North Chicago, Illinois.

W DIVIDING HEADS

Astonishingly low priced, but high in quality, these new L-W 11" Universal Dividing heads give the utmost in accuracy at a cost lower than any similar piece of equipment on the market. Ruggedly built, constructed with many new features which increase their accuracy and their use for practical, profitable shop operation.



Model BP



HEADSTOCK — New, ruggedly designed for maximum rigidity. Can be swiveled to an angle.

TAILSTOCK - New design, heavier and stronger.

HEADSTOCK SPINDLE — Tapered bearings, bored for No. 10 B. & S. taper, Increased diameter and length. Threaded nose 24' diameter 10 thread USS.

WORM — Made from special alloy steel, accurately finished, end thrust taken by ball bearings. Means are provided to make adjustment of worm wheel easily and accurately.

WORM WHEEL — Large diameter, 40:1 ratio, accurately generated, securely mounted on spindle.

EQUIPMENT — %" table slot tongues, three index plates are furnished, dividing all numbers to 50, and even numbers to 100, with the exception of 96 T. The Index chart furnished gives all divisions obtainable to 380.

MODEL BP FOR PLAIN

\$128.55

MODEL AU—FULL UNI-VERSAL FOR COMPLETE INDEXING AND SPIRAL CUTTING

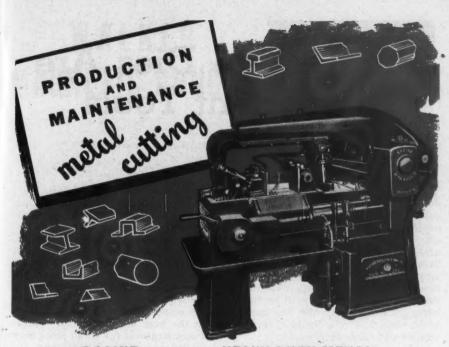
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with RACINE hydraulic HEAVY DUTY METAL saws

The Racine Heavy Duty Production Saw has a progressive combination "Positive" and "Flexible" hydraulic feed. The "Positive" feed predetermines cutting time. Each cut, even though it be made in tough alloys or tool steels, is made in exactly the same length of time.

The "Flexible" feed permits blade to cut faster when resistance is reduced. Faster cutting is attained in round bars, tubing, through the thin section of structurals and other shapes, by the use of this feed. This progressive combination "Positive" and "Flexible" feed is exclusive with Racine.

Racine's complete saw line includes a wide range of machines. Models are available to meet the varied requirements of all metal working industries. Capacities from 6" x 6" to 20" x 20",

Write for complete catalog and time study of your work. Address Department MM-S.

RACINE OIL HYDRAULIC PUMPS AND VALVES

Racine "Variable Volume" Off Hydraulic Pumps and "Balanced Piston" Valves provide special advantages for hydraulic circuits in a wide variety of applications. Pump capacities of 12-20 and 30 G.P.M. Operating pressures 50 to 1000 lbs. Valves in all sizes to 1½". Write for Catalog P-10-C.



RACINE
TOOL AND MACHINE
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Progressive Dies Are Important Tools

By C. W. HINMAN Designing Engineer

DURING the present great demand for more and better tanks, tank destroyers, bombs and bombers, helicopter planes, submarine chasers, Liberty and Victory ships, and scores of other large tools of war, we may give little thought to the less spectacular war equipment or how it is made. We like to think that in some mysterious way all the lesser tools will be there when needed. But, like the major tools, none will actually be there unless we put them there.

The details in the manufacture of such popular tool parts as plier handles is of general interest because nearly everyone uses pliers. We may have a pair of them in the tool kit of our car, and two or three other pairs around the house. Pliers may have special jaws designed for punching holes, fastening papers together, clinching staples and evelets, or assembling of parts. They have even been made for tying knots in string. Pliers are the best known and probably the most widely used of all the hand tools which have a mechanical movement.

Even though the steel used in plier handles is one of the most critical of materials, yet thousands of such hand tools must frequently be released because urgently needed in the war. Equipped with either standard or special jaws, such tools are needed by every mechanic, or by those who assemble various types of war equip-

ment. On the battle front, these tools are among the first to be used when quick changes or repairs in small equipment must be made.

Plier handles are made up of right and left hand parts. The size and use for the handles determines the gage thicknesses of metal used for them. Some of the lighter types are made from sheet brass. Brass is easier to emboss and form, and will also take the best nickel finishes. Material specifications for small sizes may be 0.040 in. gage or less, and for larger ones, 0.062 in. gage or more. Steel handles are usually copper plated, nickeled, or mottled and buff polished. Requisitions for them may run from 25,000 to 100,000 pairs, and beside the press work on the handles. there is automatic screw machine work for making the rivets and pins, drilling, reaming, tapping, milling, cutting and "eyeing" coiled spring ends, assembling, riveting, plating, inspection and packing. It is quite a flourishing industry.

A Progressive Die for Plier Handles

The accompanying photograph shows a typical four-post progressive die that produces over 4,000 plier handles per hour. This die is run in a V & O press of 75 tons capacity, at 80 strokes per minute; coiled strip is fed from a reel on the right hand side of the press, and feeding is maintained by automatic rolls at the re-

WALKER MAGNETIC CHUCKS



This Type Available in Sizes
Up To 30 x 96



Walker presents a complete line of Magnetic Chucks for modern equipment . . . Rectangular, Swiveling and Rotary Types in all sizes.

"The Best Way to Hold Most Work— The Only Way to Hold Some Work."

Also belt or motor-driven DC and portable AC Demagnetizers.

Write for Catalog W-6.

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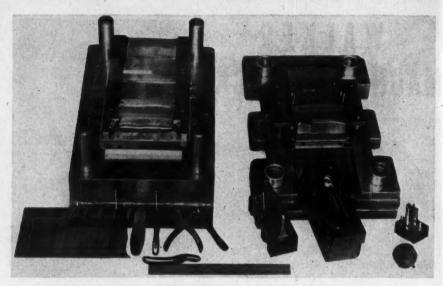
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Progressive Die for Production of Plier Handles

ceiving end of the die. An oiler lubricates the strip as it enters the dies.

The four guide bushings are of phosphor bronze, which ensures long wear without special attention. The bushings are sufficiently long so they do not pass above the post tops at the extreme up-stroke of the press ram; a feature which maintains a constant supply of lubricant within the oil grooves of the bushings and prevents wear. This die is a product of the Moore Special Tool Co., and the photograph was furnished by the courtesy

of that company.

Strip enters the dies from the right which, in the picture, is at the upper end of the die shoe. Two guide strips extend across the entire length of the die, one across each of the ends of the five die sections. The distance between the strips clears the width of material strip about 0.010 in. and this condition permits easy guiding and movement of the strip across the dies.

Punches are mounted on the punch holder face, as seen at the right, and all the cutting punches are surrounded



DYKEM STEEL BLUE Stops Losses in Making Dies and Templates

Simply brush on, right at the bench; ready for the layout in a few minutes. The dark blue background makes the scribed lines show up in sharp relief, and at the same time prevents metal glare. Increases efficiency and occuracy.

Write for full information.

THE DYKEM COMPANY

2301 F. NORTH 11th ST. ST. LOUIS, MO.

(In Canada: 444 Pacific Ave., Toronto, Ont.)

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SHARP PRACTICE!

Good cutting tools deserve to be sharp... and it takes no more time to sharpen them right than it does to sharpen them wrong.

That universally used small tool, the Countersink, is a perfect example . . . correctly sharpened, its productive output is increased—its useful life extended.

The right way to sharpen a Countersink is illustrated and described on this page. There's nothing tricky or difficult about it Simply read, study the diagram and remember that a dull or incorrectly sharpened Countersink is a net loss.

Regardless of the type of countersink (pilot or self-centering) its cutting edges are either ground cam relief or profile ground. Gairing countersinks are always furnished with ground cam relief flutes.



CAM RELIEF SHARPENING

Follow the original cam relief ex
 grind the face of the flute.



PROFILE SHARPENING

Always keep the angles as close as possible to the original flute design— Primary Land 3 degrees, Secondary Land 7 degrees.

Chatter may be caused by improper grinding. When this develops check insufficient end cutting edge angle, rake angle, speed and feed not in proper relation, excessive overhang, play in spindle bearing. For countersinking in tough, hard steel use countersinks with fewer flutes. Provide ample chip space in web.

THE GAIRING TOOL COMPANY, Detroit 32, Michigan



Manufacturers of Standard, Special and Gair-Lock Inserted Blade Cutting Tools

Reprints on request for posting in your grinding department.



by a spring pressure-pad. The pressure-pad pushes the scrap strip from the punches, when they ascend, or in other words, "strips" off the scrap.

Order of Operations

Two finger stops are seen in front of the die. The forward end of the work strip is stopped against the first finger stop when it is depressed. Next, the press is "tripped," the punches descend, and the patent stamping and handle knurling are embossed on the work.

The work-strip is then advanced and halted against the second finger stop, where four round holes are pierced; two for the rivets and two for piloting. An opening is also cut at the center of the blank which is called a "gutting cut." The gutting cut is done by a compound die; it will be subsequently stretched open in the forming operation, and is used for inserting the mating handle through it

in the completed pliers. The piloting holes are seen in the edges of the scrap strip; long pilot punches enter them at each down stroke, thus registering the strip and work correctly at the stations.

In the next advance of the strip. the previous work enters a compound blanking station. In the down-stroke the blank is cut into the die and a spring-shedder in the die rises and. on the up-stroke, re-inserts the blank flush within the strip. This operation permits the blank to be carried forward into the last and final station. In the last station the handle is drawn and formed to its proper shape. The work adheres on the punch in ascent, but is "stripped off" by the action of two little hooks which can be seen over this station. The work is blown clear of the die by compressed air.

This die makes both the right and left hand handles complete as illustrated. It requires two different form-

Everyfi Vise to ened o Vises, Quick-/ All are accurac Ask fo and She

PRODUCTO MACHINE VISES

Everything in Machine Vises—from small 3" Drill Press Vise to 9" Heavy Milling Machine Vise including hardened and ground Precision Tool Room and Jig Berer Vises, Plain, Swivel and Angle Vises in various sizes— Quick-Acting Cam Lock Vises for production purposes. All are of modern design and made for rugged wear and accuracy.

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• Much of the rolling load of the allied offensive is carried on Timken-Detroit Axles equipped with massive Bunting Bronze Bearings. These great axles are found in U. S. Army motor trucks, light and medium tank transports and many other military transport vehicles.

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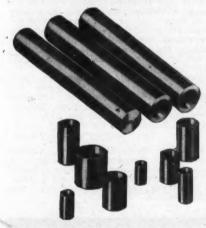
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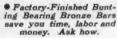
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 Exceptional load-carrying capacity, wear resistance and high anti-frictional qualities are demanded of bearings on both battle and production fronts today. Bunting Bronze Standardized Bearings meet all needs for production and maintenance of electric motors, machine tools, and all general industrial machinery. Available from stock in many sizes. Ask your wholesaler. Write for catalog. The Bunting Brass & Bronze Company, Toledo, Ohio . . . Warehouses in Principal Cities.



Butting

ing dies, one of which is shown loose while the other set is seen assembled in the die set. An extra set of piercing and gutting punches and dies is also necessary, and these are shown loose in the lower right hand corner of the photograph.

Labor Turnover High

The Office of War Information today reported that the nation's major war

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BEARINGS



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STANDARD SIZES SHOWN IN OUR GENERAL CATALOG

Copy Sent Upon Request

THE GWILLIAM CO.

358 FURMAN ST. BROOKLYN, N. Y. plants are finding it necessary to hire 17 workers monthly to get a net increase of three for every 100 employed. The OWI report was based on information from the War Manpower Commission and the Labor Department's Bureau of Labor Statistics. As for manufacturing as a whole, latest figures show that workers are not being hired fast enough to replace those leaving industry, OWI said.

American Standards Association Revises Code for Abrasive Wheels

The American Standards Association has announced approval of an important revision of the Abrasive Wheel Safety Code, which is so widely used that it has been called the Bible of the Grinding Industry.

ing Industry.

New sections have been added to keep pace with changes in the industry. Completely new rules have been written for mounted wheels. New speed rules have been drawn up for crankshaft grinding, camshaft grinding and thread grinding operations. While the basic speed tables remain the same, the Code has been carefully reviewed and many points have been clarified.

The Safety Code for the Use, Care, and Protection of Abrasive Wheels (B-7 1943) is available from the American Standards Association, 29 West 39th St., New York, N. Y., at 35c per copy.

"Modern Malleableizing in Surface Combustion Furnaces," a four-page illustrated and descriptive folder prepared by Surface Combustion, Toledo 1, Ohio, is now available from this firm free upon request.

REYNOLDS Coolant Units

No. 206 (left) Approximately 15 gal. capacity P.M. Tank 20" x 16" x 16". Ny, H.P. motor. For grinding machines, multiple spindle drills. \$95.00 each for the 110 volt 1 phase model, and 220 volt, 3 phase model. \$112.00 for

"KEEP 'EM COOLER IN ACTION"

the 550 volt, 3 phase model.

Ne.1-s (right) Approximately 7 gal. capacity P.M. 16" x 10" x 11" tank: V, H.P. motor. For Milling and Screw Machines, Lathes, etc. \$98.50 each for 110 vol! 1 phase model, and 220 vol!, 3 phase model. 550 vol!, 3 phase model, \$108.50.



REYNOLDS MACHINERY CO., 211 EDDY ST., PROVIDENCE, R. I.

for measurements ranging from 5%" to 1" with UX Indicator araduated in .0001"

Fast, Light, Accurate

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HERE'S the newest addition to the STANDARD family of Dial Bore Gages. A small, lightweight, fast checking instrument for small bores.

Utilizing the same centralizing principle of other STANDARD Dial Bore Gages, it is only necessary to insert the gage, and rock

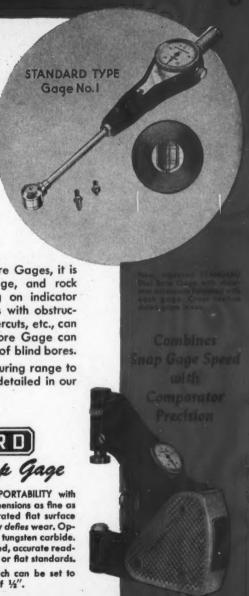
handle slightly. Minimum reading on indicator shows exact diameter. Even holes with obstructions such as shoulders, webs, undercuts, etc., can be measured because this Dial Bore Gage can measure within 1/4" from the bottom of blind bores.

Other Dial Bore Gages with measuring range to 121/8" completely illustrated and detailed in our new No. 10 Catalog.



STANDARD Dial Snap Gages combine PORTABILITY with speed in use and absolute accuracy on dimensions as fine as .0001". Adjustable gaging pin has a serrated flat surface tipped with tungsten carbide that practically defies wear. Opposite movable pin has mushroom top, also tungsten carbide. Point-and-plane construction assures continued, accurate readings whether instrument is set by cylindrical or flat standards.

16 Stock Sizes cover Range 0" to 8". Each can be set to measure any dimension within a range of $\frac{1}{2}$ ".



400% LONGER LIFE us Norton OPEN STRUCTURE

PART Miscellaneous Dies

MATERIAL High speed steel includingh carbon, high chroningh carbon, high chroningh carbon, high chroningh carbon phenomenal life by carbon very good.

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Segments

CHINE Blanchard

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THE outstanding performance of Norton OPEN STRUCTURE products — both grinding wheels and segments — is attested by many reports like these in the Norton engineering files. If you have jobs where extra coolness of cut is desirable or where the stock removal is especially high, Norton OPEN STRUCTURE products may be the answer. Norton abrasive engineers will be glad to study your grinding jobs and specify the correct wheels for each—using OPEN STRUCTURE where it will be helpful.

A folder on Norton OPEN STRUCTURE grinding wheels and segments will be sent on request—no obligation.

NORTON COMPANY Worcester 6, Mass.

W-949-A

RASIVES



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The battery of Mult-Au-Matics you see here has been steadily at work since 1938. It has made many different automobile parts for its maker. Right now, it is helping to build well-known airplane engines.

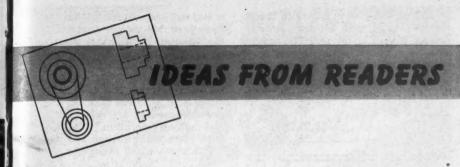
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The point to notice is this: Every Mult-Au-Matic in service replaces several single spindle machines. Since their higher output and lowered production time made them profitable even when there was no manpower shortage... wouldn't it pay you today to get a Mult-Au-Matic time-study for your most urgent jobs?

THE BULLARD COMPANY

BRIDGEPORT 2, CONNECTICUT



Air-Operated Bench Vise Expedites Chipping Operations

By F. R. ELLIOT

Superintendent of Foundry, Westinghouse Electric & Manufacturing Company, East Springfield, Mass.

THE illustration shows how a 2inch air cylinder was adapted to special vise jaws to make an air-operated vise for use on the foundry chipping floor. The vise operates almost instantaneously and holds the castings firmly, thus allowing the

WOOD BLOCK GRIPS CASTING TIGHT

By Using an Air-Operated Vise Equipped with a Special Wood Jaw Insert, Production is Increased, Fatigue is Reduced, and Castings can be Held Which Are Difficult to Hold Between Steel Jaws

chipper perfect freedom of action.

The air cylinder was mounted in a horizontal position on the bench, as shown, and the piston was attached to a special movable jaw carrying a wood block. The wood provides a firmer grip on the rough surface of the casting than can be obtained with a steel jaw. By moving the lever in the air line to right or left, the piston can be moved in or out as desired. Normal pressure from the shop air line is sufficient to hold the average casting.

In addition to the increased production resulting from the application of air to the vise-jaw, the device eliminates the fatigue incident to the tightening and releasing of the heavy bench vise screw. Also, the elimination of the vise screw and handle makes it possible to hold odd-shaped castings which could not be held in the ordinary vise in the usual manner.

The vise is popular with the chippers because of the ease with which it operates and the advantages of the wood jaw.

Milling Fixture for Form Cutting

A HOLDING device developed at General Electric's Schenectady Works permits groove milling with a staggered-tooth side-and-face cutter instead of a form cutter.

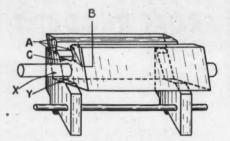
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Milling the groove shown in the attached sketch with a form cutter required a very heavy cut. The amount



Drawing of Milling Fixture for Form Cutting with Staggered-Tooth Side Cutter

of material removed quickly dulled the cutter, necessitating frequent regrinding. Obviously, each time the cutter was reground its dimensions were changed, and a very careful readjustment of the miller was necessary.

A slot the width of "C" is first

milled out and surface "C" then milled to desired dimensions. Surface "X" of the locating device is finished to be parallel to proposed surface "A" when the piece is in position. Surface "Y" is at 90 degrees to "X." The V in locating device is cut so that when the piece is in position, the "B" surfaces are vertical and are machined as an end milling operation. The piece is then turned end for end and surfaces "A" are machined in similar manner.

Tool for Staking Keeper Pins

A SIMPLE device for staking the keeper pins used on spark plug bushings in the cylinder heads of Lycoming aircraft engines has reduced the former amount of scrap loss from this operation by 98 per cent.

Heretofore, a prick punch was used to stake the keeper pins. This method



atlas ANT PUMPS COOLANT

Now you can equip every machine tool for higher production with a compact, portable, low cost Atlas Coolant Pump — screw machines, lathes, drill presses, milling machines, cut-off saws. Cuts tool wear, cuts rejections for poor finish. Powerful centrifugal type pump handles any cutting fluid; flow is adjustable from drip to stream. Two models, universal or induction motor, handling 450 and 225 GPH. Feed lines are durable, tough

extruded plastic. Ask your Atlas distributor for full details about Atlas Coolant Pumps or write us, Ready for immediate delivery.



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1944

ATLAS PRESS COMPANY

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LATHES - DRILL PRESSES - ARBOR PRESSES - SHAPERS - MILLING MACHINES

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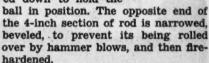
failed to distribute pressure of the hammer blow, with the result that adjacent metal of the cylinder head occasionally was cracked during the operation.

A supervisory member of this division of The Aviation Corporation at Williamsport, Penna., devised a simple peening punch for this operation and several such punches have been supplied to the cylinder head line.

The tool is made from a short

Design of Tool for Staking Keeper Pins. in Cylinder Heads of Aircraft Engines

length of drill rod which is bored at one end to receive a %-inch steel ball. The end is then turned down and after insertion of the ball the feather edge of the end is tooled down to hold the



This easily-made and inexpensive tool when used for staking the keeper pins results in their being peened rather than wedged out at a given spot, inasmuch as the hammer blow is distributed by the spherical surface on the steel ball in the end. In addition, hazard of cracking finished cylinder heads has practically been eliminated.

SEND FOR BRAND NEW ILLUSTRATED CIRCULAR ADJUSTABLE KNURL HOLDER







This new circular tells how the Graham Knurl Holder produces many patterns from one set of knurls, and gives details of the amazing variety of work and range of capacities of the several models, handling work up to $2\frac{1}{3}$ ° dia.

Request Illustrated Price Circular

GRAHAM MFG. CO.

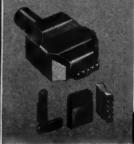
39 BRIDGE ST. EAST GREENWICH, R. I.

Bearing Balls Serve as Punches

By A. H. WAYCHOFF

OCCASIONALLY one has to punch a few holes in a sheet metal piece, where the job isn't large enough to





FASTER, EASIER GANG-STAMPING ... HERCULES PRESS HOLDER

For stamping any untempered metal or material with either numbers, letters or symbols. The diagram shows how the type is tapered to the face to facilitate accurate positioning. Also exra body and shoulder, which gives added strength to the character. One piece solid bar steel stock assures long service.

Descriptive literature sent free on request.

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This war demands speedy action. Universal's special process of manufacturing Abrasive Wheels and Stones meets this demand . . . with guaranteed 10-day delivery speed.

Your work demands perfection ... for speed without efficiency is costly time lost. Our controlled trial plan of

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NUBON Wheels are used today by leading American war plants to meet their most exacting war production specifications. We can also help you solve your toughest grinding problems.

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2630 Van Buren Street, Chicago 12, Illinois



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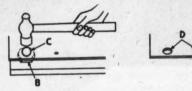
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justify the expense of a special punch. In many cases the job can be done by the use of a plain nut and a ball from an old ball bearing.

The procedure is as follows: first indent the spot where the hole is to be made, using a small round-nose punch as shown at A in the illustration, then obtain a nut in which the hole is of the size required in the workpiece and center it under the in-





Drawing Illustrating Method of Punching Holes by use of Nut and Steel Ball

dentation as shown at B. Now position the ball in the indentation, as at C. and strike the ball a sharp blow with a medium heavy hammer. If the blow is sufficiently heavy, a clean hole will be cut in the sheet metal, as shown at D.

Suggestion for Machine **Tool Guards**

By C. F. FITZ

EVERY time I see a machine tool operator — who ought to know operator - who ought to know better—leaning on a guard that covers a dangerous part of a machine, such as gears, or a belt, I feel that his intimate association with danger is due

February, 1944

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Licensed Under Pratt & Whitney Patents

You want the gage that checks all principal causes of thread failure: errors in lead, pitch diameter, form, straightness, and out-of-roundness. That's what you get in the "Greenfield" No. 1625 Roll Thread Snap Gage.

Also you get speed, because of its open end construction. And long life—its rotating rolls reduce friction.

Note that when rolls, eccentric pins, and other parts do wear out, these parts as made by "Greenfield" can be used in the John-Son's type of gage made by any manufacturer.



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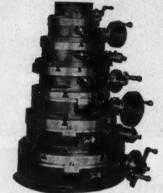
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ch nis ue to ignorance. He has no conception of the danger that lies beneath the guard. While the guard is intended to protect him, it is not intended to serve as a Guardian Angel—and it is possible for a guard to break, or to loosen from its anchorage.

If the mechanism under the guard were exposed to view, it is probable that the heedless workman would be less inclined to get so near to the operating parts. This could be done by making the guards of a clear plastic, such as Lucite, which would not only achieve the desired result but would also save valuable metal for war production.

Furthermore, it is probable that maintenance expense would be reduced considerably if the operators were able to see, without removing the guards, just what the mechanism is beneath the guards and its condition. One could also see any oilholes or cups that might need attention and which would otherwise be neglected.





Sizes 9", 12", 15", 18"
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"What Makes a Grease." As a part of its campaign to improve lubrication methods and practice, the Sun Oil Company has published a highly useful booklet entitled "What Makes a Grease." This booklet briefly discusses the standards by which a good grease should be judged. It points out the various fac-tors which should influence the selection of the proper grease for a specific job. It describes the outstanding characteristics of the various Sun greases that have been developed for different uses, including adhesive pressure grease, gun grease, pressure system grease, roll-er bearing grease, and mine lubricants. It cites specific applications of these greases and results obtained. It explains the service offered through Sun Oil engineers in the study and solution of the many and varied grease problems encountered in every type of plant.

Copy of the booklet is available without charge to industrial engineers or production men interested in lubrication writing to the Sun Oil Co., Dept. 1, 1608 Walnut St., Philadelphia 3, Pa.

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Made of correctly-heated alloy steel. Central striking point gives uniform indentation. Thumb side marking makes them easily read — easily used. Write for catalog.

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Cool, clean and fast even under the terrific friction heat of punishing work. No sanding job too tough. Flexible for concave, convex and reverse curve sanding.

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HERE'S A Machine-Saver!

There's less strain and wear on your machines and machine parts when you use Sutton collets because Sutton's patented Diamond Grip takes horizontal and rotary thrusts at an angle and holds tightly with 10% to 15% less tension.

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practically zero, you can step up machine cycles to tool capacity—boost production and cut costs while cutting down wear and repairs. Patented Diamond Grip is self-cleaning—dirt, scale and chips work out automatically—does not clog—costs no more than ordinary collets.

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THE CLEVELAND PUNCH & SHEAR WORKS COMPANY Cleveland, Chio PITTSBURGH



war industries depend on better, safer, longer-lasting Plomb tools

The Plomb hinge handle is a favorite because it gives three advantages in war production—

1. It provides maximum flexibility.

2. Light yet strong, it is safer to use than ordinary types.

3. Made right so it will last longer.

All tools in the famous Plomb line are well-known for the better, safer, longer service they give. Call the friendly Plomb dealer near you to help you get exactly the kind you want for your war job—from screwdrivers to sockets and attachments.



PLOMB TOOL

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You Can SPEED UP YOUR PRODUCTION

on Threaded Parts for Tanks, Guns, Bombs, Shells—with

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THREADING TOOLS

4 Weeks Delivery

Murchey gives you the better, faster and more accurate threading you need to speed up your production on threaded parts. And Murchey quick delivery enables you to start your increased production schedules much sooner. Hurry and get full information on Type "B-M" Collapsible Machine Tap and Type "G" and Type "C-O" Self Opening Die Heads.

Catalogues on request—write today. Also get information on Murchey Thread Milling Machines, Shell Tapping Machines, and Roller Pipe Cutting-off Machines.

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Type "G" (non-rotating) Self Opening Die Head Designed and engineered for use en any mechines where die heads de not rotate. Made in sizes from "is" up to and including 6"

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February, 1944

Type "C-

of Type "G"

Self Opening Die Head

A companion to Type "G" for

use on machines where the die head revolves. Takes the same chasers as well as many parts

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MODERN MACHINE SHOP

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Tool Control System Aids Production at Grand Rapids Stamping Plant

A TOOL control system, designed to increase the efficiency in grinding, inspecting, storing, maintaining, salvaging, and disbursing of cutting tools has been installed at the Grand Rapids Stamping Division of Fisher Body. The system has aided materially in the effort to maintain high machine production, consistently raise the quality of the finished product and decrease the amount

of scrap and deviations, as well as to increase the life of cutting tools.

The system was an outgrowth of the known fact that cutting tools will last much longer and perform better if they are regularly inspected and sharpened. To accomplish this point a plan was evolved whereby sets of tools would be scheduled to the machine according to the operation to be performed on those machines. Each tool set includes the entire complement of tools necessary to complete the operation.

The length of time that a set of tools remains on a job was determined by an

actual performance check based upon the replacement cycles upon which the tools are scheduled to and from the machines. Grinding and disbursement cribs, along with the tool bank storage, are centrally located within easy reach of all machine areas. Dispatching



Mechanical Conveyor which, as a part of the Tool Control System recently installed at the Grand Rapids Stamping Division of Fisher Body, carries the filled tool sets from the "bank stock" area to the disbursement crib for storage until needed on a new job.



IDEAL SPEED LATHES

eliminate secondary-finishing-operation bottlenecks. They insure better quality, greater accuracy and uniformity, coupled with substantially increased volume of production. Quality engineered and built for precision performance in continuous, 24-hour-per-day use.



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A type and size for almost every finishing purpose. Available with single or two-speed motor; automatic, magnetic brake; variable-speed equipment; collet, chuck, vacuum chuck, or expanding mandrel fitting; hand-, foot-, or air-operated; bench or pedestal. State YOUR finishing problem. Write for Catalog No. 440.

CHAUER MACHINE

ORIGINATORS OF TODAY'S SPEED LATHES 2060 READING ROAD -- CINCINNATI 2, OHIO

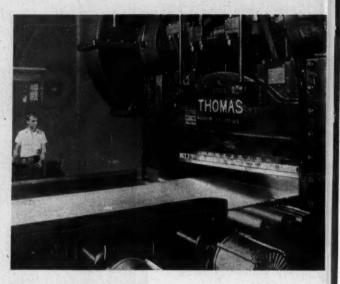
Thomas 11/2-Inch Shear Equipped with Conical Rolls

of all tools to and from machines is controlled by the Production Scheduling Department and deliveries are made by routed trucks which also operate upon a regulated schedule.

Tool sets, returned from the floor, are inspected upon receipt. Damaged, broken, and worn tools, along with

those which need sharpening, are removed and a tool replacement slip bearing the code numbers of the tools is placed in the box. The containers then pass along a conveyor to the "bank stock" area. Perfect replacement tools are added to the set, after which it is passed along the conveyor to the disbursement crib for storage until needed.

Dull tools, after being removed from the sets, are ground and honed, rigidly examined, sealed and replaced in the bank stock to await future use. The tool control system has enabled the Grand Rapids Stamping Division to maintain high production sharpening of precision cutting tools as well as conserve tools and reduce lost time in man hours and

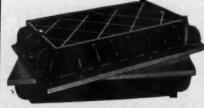


machine hours on the production opera-

Conical Rolls Save Work Surface

WORKER at the electrical controls halts a plate of aluminum beneath a high speed shearing knife in one of the huge new fabricating plants of Aluminum Company of America. The rolls are conical; thus the plate makes contact only along the edges to avoid scratching the highly polished surface. These 1½-inch shears were manufactured

REID PRECISION-PLANED SURFACE PLATES



Accuracy guaranteed on 12" x 18" size within .0005". On 36" x 72" within .0015".

Thoroughly normalized and weather seasoned Reid Precision - Planed Surface Plates have proved thoroughly satisfactory on work to close limits.

Excellent delivery-Write for prices-details.

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SPARTANS CUT TO BEAT THE BAND SPARTAN HACK and BAND SAWS

Increase production and reduce costs per cut. The Spartan method of heat treating results in unusual cutting and wearing qualities, rigidity, strength and toughness.

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Spartans Get Results

Spartan Saw Works, Inc. SPRINGFIELD, MASS.

by Thomas Machine Manufacturing Co.. Pittsburgh, Pa. Thomas shear installations in Alcoa plants include shears up to 3-inch capacity—among the most powerful plate shears ever used for this type of work.

Handling Tall Work on a **Short Machine**

Although a small operation or light cut only may be required on a bulky piece of work, the size of the work often ties



Boring Small Hole on Angle in End of Crank-shaft, Using Bridgeport Milling Machine Equip-ped with Hoover-Riser to Increase Capacity of Machine

up larger machines than the importance of the operation would seem to justify. In many cases such work can now be handled on smaller machines, where the machines are such that a blocking-up attachment known as a "Hoover-Riser" can be installed.

On the Bridgeport Milling Machine shown in the illustration, the Hoover-Riser can be installed in a few minutes and increases the over-all capacity of the machine by six inches without impairing its rigidity or accuracy.



UTILITY TOOLS

In a matter of minutes you can convert your engine lathes into screw machines. Simply remove tail stock and install a Utility Turret and Crossfeed Cut-off. Turret has rack and pinion which assures steady feed. Raised bearing surface eliminates all chip trouble. Has two taper gibs for take-up and alignment. All ways and bearing surfaces are ground. All inserts, bushings and pins are hardened and ground. Hex is 5½" across flat, 2-7/16" thick. Accommodates a ½" hole or a No. 1 or 2 Morse taper. Fits Logan, South Bend, Atlas, Craftsman, 10" Sheldon, Clausing, etc.

Cross Slide pictured here has rack and pinion, two tool holders with adjustable jacks. Weight approximately 40 lbs.

> Collet Closer parts are hardened and ground. Full ball bearing. Only wear is on ball bearings. Write for detailed literature.



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(Left)—Anne Gallik of General Electric's industrial heating and welding engineering division places a steel bushing in the induction coil, then pushes a button and a G-E electronic heater goes to work converting ordinary 60-cycle electric current to 500,000-cycle current and in three and one-half seconds the surface of the bushing has reached a red glow temperature of 1,550 F. (Right)—A timer automatically cuts off the current to the inductor coil of the electronic heater and turns on a violent water spray in the final heat-treating operation— quenching to fix surface hardness.

The Hoover-Riser is a grey iron casting, recessed for bolts and machined to fit the standard milling machine shown. Bolted in place, it becomes an integral part of the machine. The demonstration shows a small hole being bored on an angle in the end of a crankshaft, an operation that otherwise would have had to be done on a high-priced horizontal boring machine. As it was, the job was done quickly and satisfactorily on the Bridgeport, thanks to the Hoover-Riser.

Fast, Precise Heating Done Electronically

Electronic heating, is doing many war jobs faster and with more precise localization of heat than ever before. New electronic heaters recently introduced by General Electric make possible hardening, brazing, and soldering operations in seconds instead of minutes. G.E. now has more than 100 electronic heating install-



224

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WHEN THERE'S WORK TO DO United States Electrical Tools Do It "Give us the tools," industry shouted, "and we'll produce the ammunition, the planes, the ships, the guns."

Our response was a thunderous, "You bet! We'll give you better electrical tools than ever and more of 'em.

And today THE UNITED STATES ELECTRICAL TOOL COMPANY is still doing its share...a big share...in helping you, the men who are pouring forth an endless stream of things the war effort demands relentlessly.

FLEXIBLE SHAFT MACHINES

For overhead or floor mounting. The power transmitted by a flexible shaft is governed by the diameter of the bore and the speed at which it is operated. Motors are ball-bearing: 40-degree ratings and will stand a momentary overload of more than 100%.

The UNITED STATES ELECTRICAL TOOL Co.

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Cincinnati Hypro Planer with Divided Table at Work in Ohio Steel Foundry Plant

ations in its own plants.

The illustrations show how easily a small bushing or other small workpiece can be surface hardened, using a G-E electronic heater.

Divided Planer Table

At the plant of the Ohio Steel Foundry Company, Lima, Ohio, much time is saved by the use of a Cincinnati Hypro



CIRCLE CUTTING ATTACHMENT Included as Standard Equipment With This Machine

Cuts...inside or outside...straight or curved...flat sheets or formed work

Even an unskilled operator can follow a scribed line, easily and rapidly. Shears flat or formed sheet metal, internal or external, plain or irregular shapes. Vision is unobstructed; both hands are free to guide work at all times. No resistance to feeding or turning. Action of cutters does not "feed" material. Write for Bulletin.

Made in sizes up to 60-in. throat, 10-gauge capacity

Cleaner, smoother edges

Libert HISPEED SHEAR LIBERT MACHINE COMPANY, GREEN BAY, WIS.

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Vitrified Bonded Wheels are very much in the Cortland production picture — and the Circular Continuous Tunnel Kiln shown here is a step toward better delivery on this type of grinding wheel, in sizes of 16" and smaller. You can depend upon Cortland for quality — and for better deliveries than ever before when you want them.



CORTLAND GRINDING WHEELS CORP.

10 CORTLAND STREET CHESTER, MASSACHUSETTS

CORTLAND GRINDING WHEELS

February, 1944

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Planer with a divided table. This planer, which is 48×48 inch $\times 20$ feet in size, is equipped with two 4×10 -foot tables which can be used individually or connected to form a 4×20 -foot table.

The principal advantage of the divided table is that, where small lots are necessary, the operator can be machining one set of workpieces on one table while a helper is setting up a lot of another kind on the other table. When the pieces in process are finished, the table upon which they are located is run to the free

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TYPE HÖLDERS AND TYPE ... ROLL MARKERS ... HAND STAMPS LOGOTYPES DIES _STANDARD AND SPECIAL STAMPS INSPECTORS STAMPS MACHINE ENGRAVING ... PRECISION DUPLICATING

NEW METHOD STEEL STAMPS, Inc. 149 Joseph Campau, Detroit 7, U.S.A. end of the bed and the other table is moved over the bull-gear in the working zone. The finished pieces are then removed from the idle table and another lot, perhaps of entirely different pieces, set up to be ready for processing. The management of the Ohio Steel Foundry reports that a considerable saving results from this method of working.

Salvage Manual for Industry

Published by the Technical Service Section, Industrial Salvage Branch, Salvage Division, War Production Board, this 6 x 9-inch manual contains 245 pages of systematically organized and classified information and data—most of it of a "how-to-do-it" nature—on industrial salvage practice in all its ramifications. The material is presented in 26 chapters, grouped into six major sections. Included are two chapters on organizing and planning the salvage department; three chapters on the administrative factors; 12 chapters on methods of handling (finding, identifying, segregating, collecting, reclaiming, storing, selling, and so on) metal scrap; three chapters on non-metallic waste; seven case histories demonstrating exemplary practice; a 17page compilation of practical hints for handling specific waste materials; and a nine-page index.

The well-illustrated volume was prepared and edited by an editorial board of practical industrial salvage engineers and business paper editors comprising the following: Editors, Robinson D. Bullard of The Bullard Company, and Fred P. Peters of "Metals and Alloys"; Associate Editors, H. E. Blank, Jr. of "Modern Industry," Arthur M. Perrin of National Conveyors Company, E. J. Tangerman of McGraw-Hill Publishing Com-





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pany, and R. A. Wheeler of The International Nickel Company, Inc.; Managing Editor, John O. Emerson of the Industrial Salvage Branch, WPB. Assisting the editors either with direct contributions or advice was a corps of some 40 engineering or salvage experts. No effort has been spared to cover every possible phase of practical industrial salvage operations and to present the most reliable and authoritative information about them.

Although its major purpose is to speed Victory, the "Salvage Manual for Industry" is certain to have continued application in postwar industry because of its attention to the economic benefits of sound salvage practice. Copies of the manual are available at a price of 50 cents each and and can be obtained through the Superintendent of Documents. Government Printing Office.

Washington, D. C.

"Cavalcade of Fighting Horsepower," a 16-page booklet published by Caterpillar Tractor Co., Peoria 8, Ill., includes a graphic portrayal of the part "Caterpillar" Diesel tractors, motor graders, and electric sets as well as other prod-

ucts are playing on many fronts of World War II, including the Aleutians, Africa, New Guinea, Great Britain, Mediterranean, and New Caledonia. Copy of booklet is available free of charge by requesting Form D324.

U. S. Special Cutting Tool Handbook. A 60-page handbook which includes illustrations and mechanical drawings of special high speed steel cutting tools, such as milling cutters, forming tools, end mills, reamers, counterbores, backoff, gang and many types of miscellaneous specials, has been released by the U. S. Tool & Mfg. Co., 6906 Kingsley, Dearborn, Michigan.

Medium-size plants who do not have engineering facilities for designing tools should find the book especially useful in figuring out the kind of special cutters they may need. On many of the pages, in conjunction with the illustrations of the tools, are shown mechanical drawings on which the dimensions have been left off so that the user may fill them in to suit his own special requirements.

Copy of the Handbook is available to mechanical executives addressing a request on their company letterhead.

CATSKILL Abrasive Cut-Off Machine CUTS FASTER, SMOOTHER, STRAIGHTER



POWERFUL · ACCURATE · SAFE

Cuts solids to 2" and tubing and shapes to 3"—cleanly —without secondary finishing operations.

MODEL "W"

Cutting wheel runs in slotted pipe through which coolant is piped. This prevents surface hardening, burr and burn, and insures a smooth, finished cut.

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HIGH CARBON
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PIPE AND MAN

OTHER MATERIALS

CATSKILL METAL WORKS, Inc.



When tapping holes in costly machined parts, particularly bottoming holes where at times the material may run "tough" or have hard spots or where operators are less experienced, it is sometimes a good idea to cut a groove in your tap shanks so that the shank will break before the tap sticks and ruins the part. It will also ensure that your tap will break outside and not inside the hole for easier removal of the broken part.

"Detroit" taps themselves are tough and do not break easily. Most of the time that's an advantage. Once in a while it isn't and you might wish that they weren't quite so good as they are. Sometimes you want to break a tap.

BUY U.S. BONDS STAMPS



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Post-War Machine Tool Situation Discussed

Appointment of a task group from the industry to formulate a broad policy for the redistribution of surplus machine tools after the war, was recommended recently at a meeting of the Machine Tools Industry Advisory Committee with War Production Board representatives in Washington.

The subject of the condition in which surplus or used machine tools might be exported after the war also was discussed. Particular reference was made to the possible need for inspecting such machines and putting them in good working order, as well as the need for adequate packing and crating. Appointment of a task group by the Tools Division of WPB, to make recommendations on this subject, also was suggested.

Possible simplification of Preference Order E-1-b, which governs allocation to purchasers of the monthly production of machine tools and provides a sequence of deliveries, was proposed by WPB. It was suggested that quotas under the order may no longer be necessary and that reporting of order boards might be eliminated. It was pointed out that proposed changes in Order E-1-b would be subject to the

approval of other Government agencies concerned.

A. S. T. E. Annual Meeting March 26th-28th

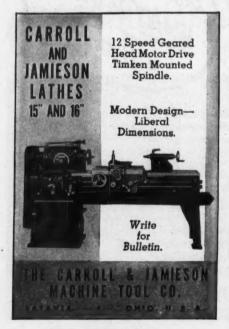
The annual meeting of the American Society of Tool Engineers has been scheduled for March 26th to 28th, inclusive, in Philadelphia, Pennsylvania, with headquarters at the Bellevue Stratford Hotel. No technical sessions are scheduled for the first day, the entire day being devoted to the annual meeting of the Board of Directors.

Technical sessions are scheduled, however, for both morning and afternoon on the 27th and 28th as well as the evening of the 27th. The annual banquet will be held Tuesday evening March 28th

held Tuesday evening, March 28th.

Condensation of the technical sessions of the annual meeting into only two days is in line with present conditions requiring the maximum possible conservation of time on the part of members of the technical organization while still securing the maximum interchange of information.

In contrast with the last two years, no Machine and Tool Progress Exhibition is scheduled. It is unlikely as a matter of fact that any shows will be held by the Society prior to the termination of European hostilities. Plans are being projected, however, for the holding of the largest exhibition in history of production equipment, tools and machines approximately 90 days after the end of the war in Europe.



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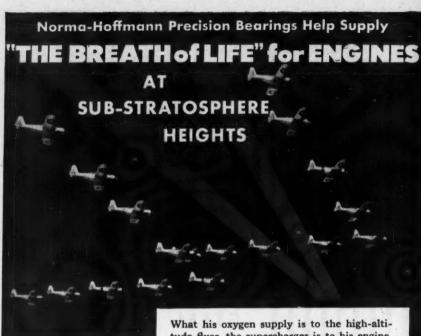
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tude flyer, the supercharger is to his engine. Failure of either is fatal. Together, they make sub-stratosphere flying possible...In the use of anti-friction bearings in superchargers, as in so many other aviation applications, NORMA-HOFFMANN pioneered the way. The terrific speeds of supercharger operationoften as high as 60,000 RPM-demand that ULTRA-PRECISION long characteristic of NORMA-HOFFMANN BEARINGS. And today, not only in superchargers but elsewhere throughout the plane including engines, controls, instruments, accessories and armament-"where the bearings MUST NOT fail"-NORMA-HOFF-MANN PRECISION- BEARINGS are doing their part in winning and maintaining air supremacy for the Allied Air Forces in every theatre of the war.

Let our ongineers work with you.

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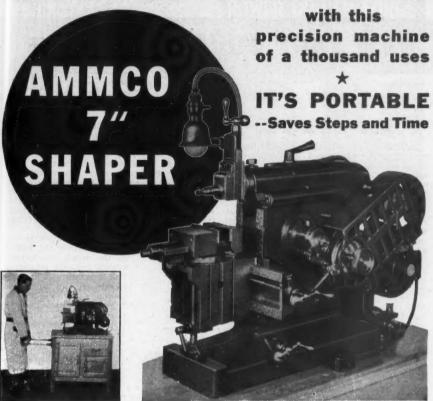
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SPEED-UP WAR PRODUCTION JOBS



Just wheel up to bench -- plug in -- go to work!

On jobs requiring a stroke of 7" or less, the AMMCO 7" PRECISION SHAPER will enable you to save a lot of time and expense in a set-up which would be required for larger shapers. Furthermore, the AMMCO will enable you to get away from the cost of operating a big shaper on small work.

Portable Cabinet, as shown above at left, available as optional equipment, enables this shaper to be moved about the shop. It can be rolled from one job to another, and can be brought right up to machine or bench where man is working...Write today for specifications and prices.



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Onsrud A-96 Bevel Mill

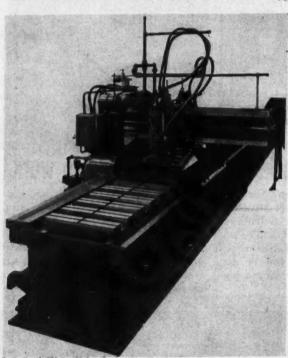
Intended for milling long flat bevels on aircraft wing and fuselage sheet stock so that skin sheet sections may be lapped to form perfectly smooth surfaces a high speed traveling carriage milling machine to be known as the Onsrud A-96 Bevel Mill has been brought out by the Onsrud Machine Works, Inc., 3924 Palmer St., Chicago 47, Ill. Bevels with surface widths up to 8 inches may be machined with the unit. Surfaces are said to be milled to a mirror finish in a single pass and so that they will check true-flat to 0.0001 inch.

Basically, the Onsrud A-96 Bevel Mill consists of a long bed and T-slot table on which work is held. A carriage travels over the bed to move the cutter head along the work. The bridge arm of the carriage holds two cutter heads, each of which may be tilted up to 15 deg. off perpendicular in a vertical plane parallel to a vertical plane running lengthwise with the bridge arm.

Bevels may be milled on work in two different types of operations, the nature of the work determining

which type is employed. For a constant or straight line bevel, the work is set up on the table so that the bevel milled will be parallel to the direction the carriage travels or, in other words, parallel to the length of the bed. The bridge arm is positioned to form a 90-deg. angle with the length of the bed and direction of carriage travel.

Cutter heads are set at the angle required to make the bevel. Both cutter heads may be used in one pass if necessary. End mill type or fly cutters may be used for a recommended maximum working diameter of 8 inches. Cutters are diinches. rectly driven at 3,600 r.p.m. by 15 h.p. motors. In this type of setup, the carriage is driven over the bed and the bevel milled as the carriage travels over the work. On the machine illustrated



Onsrud A-96 Bevel Mill

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(15-foot bed), a bevel up to 110 inches in length may be milled using one cutter motor, and a bevel up to 78 inches long may be milled using two cutter motors. The machine is designed to allow bed sections to be added to provide for beveling of this type to any required

For a bevel on a taper or crosswise edge, the work is milled by moving the cutter head in a vertical or untilted position across the bridge arm screw. Work is held in a fixture in a titled plane to the angle of the bevel required. Bevels of this type can only be as long as motor travel across the bridge arm permitsa 30-inch travel being the maximum for 90-deg. crosswise edge and less for a taper edge, depending on the angle of the taper.

An outstanding construction feature of the Onsrud A-96 Bevel Mill is a centrifugal bearing preloader which is said to be responsible for the 0.0001 inch machining accuracy of the vertical motor-driven end mill cutters. A specially designed Onsrud vacuum chuck is employ-

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Landis Type CH Plain Hydraulic Grinder

Landis Tool Co., Waynesboro, Pa., announces that its plain hydraulic grinder in both the 10 and 14-inch swing sizes now includes a number of refinements and is being offered under the designation Type CH. The wheel feed mechanism has been completely redesigned. A large micrometer ring at the rear of the feed-up handwheel allows for accurately setting the desired amount of hand feed. Graduations on the ring are normally read in thousandths in terms of work diameter reduction. By making a simple adjustment, the same graduations can be read in tenths of thousandths in

terms of work diameter reduction.

The automatic wheel feed, which is considered standard on power traverse machines, is built into the wheel base and is automatically reset at the end of each grinding cycle without the operator changing the position of the wheel feed handwheel, thus simplifying operating procedure and eliminating spoilage of work due to neglect on the part of the operator to reset the wheel when changing workpieces.

Hydraulic straight infeed is supplied only on order, however, when it is fur-nished, the automatic wheel feed feature is still retained. The stroke of the



Adaptable to a wide range of light or heavy work, for maintenance or production use . . . adjustable for different thicknesses of dies and material . . . extremely powerful yet little effort . . . ram free from obstruction assuring full vision of work, that makes possible use of longer guide. Complete Information upon request. Ask about repair parts service.

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Landis Type CH Plain Hydraulic Grinder

hydraulic straight infeed is adjustable from 1 to 31/2 inches and slow feed, from 0 to 0.120 inch on the work diameter. A special hydraulic straight infeed arrangement is available for use when cheek grinding, in which case the slow feed is adjustable from 0 to 1 inch. According to the manufacturer, changes in oil viscosity due to temperature changes

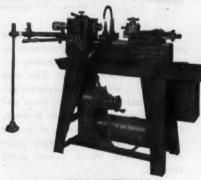
are prevented from influencing the accuracy of the feed by an automatic compensating device.

The grinding wheel guard is mounted stationary on the wheel base and has a hinged side to facilitate changing of wheels. A hinged hood at the front of the guard can be adjusted inward as

the wheel becomes worn. The coolant nozzle, which is designed to minimize spray, is attached to a flexible metal hose which can be adjusted to stay in any desired position.

Extra smooth headstock faceplate rotation is said to be assured through the use of anti-friction bearings and an all multiple V-belt drive. The headstock is

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- MEANS FOR RE-ALIGNING TURRETS
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- MOTOR-DRIVEN COOLANT PUMP
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A Readstock of Sidney Labe. Numerals I and Point to center bearings; other arrows indicate 14 Ampco bushings in the gears.

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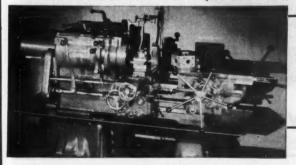


When you buy machine tools or other heavy equipment, it pays to check for parts of Ampco—the metal that stands up and gives several times the life of ordinary bronzes. Adopted by 90-odd leading machine tool manufacturers. • Write for bulletins which will aid you as a buyer and user of machinery—or help you specifically with your design problems involving wear, corrosion, shock, or other severe conditions.

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Department MM-2

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much lower than previous headstocks on like machines and is compact in design. The footstock is ruggedly constructed, and, on order, a wheel truing bar with micrometer adjustment can be built into the footstock base. A hydraulically-operated footstock with foot pedal control can also be supplied on order. All electrical controls are mounted within a completely enclosed compartment at the rear of the bed.

Such standard Landis features as the dual cylinder type hydraulic work table traversing mechanism and microsphere wheel spindle bearings have been incorporated into the design of the Type CH machine. As was the case with the previous 10 and 14-inch Type C machines, the Type CH is available with a large amount of special equipment which is said to increase the versatility and facilitate high production on parts having unusual shapes and characteristics.

unusual shapes and characteristics.

In both the 10 and 14-inch sizes, the Landis Type CH Plain Hydraulic Grinder is available in 18, 36, 48, 72, 96, and 120-inch lengths. The standard grinding wheel measures 30 x 3 x 12 inches. The headstock is powered by a 1 h.p. constant speed motor and the wheel, by a 10 or 15 h.p. constant speed motor. Weight of 10 x 36-inch machine, 10,800 pounds.

Preis Model UE-3 Panto Engraver

Designated as the Model UE-3 Panto Engraver, a unit for heavier and more varied engraving work than that performed by its standard Model UE machines is announced by the H. P. Preis Engraving Machine Co., 149A Summit St., Newark 4, N. J. The unit is said to be suitable for engraving on all metals and plastics, for electrical marking on steel and other ferrous metals, and for acid etching on metals or glass.

The Model UE-3 can be equipped with a forming guide attachment to engrave on concave, convex, spherical, and beveled surfaces. A depth-of-cut regulator for engraving on uneven or curved surfaces is available. Pantograph ratios range from 1.7 to 1 to 7 to 1, with all main ratios marked on the bars and any intermediate ratio easily obtainable from a pantograph chart furnished.

The cutter spindle has adjustable ball bearings and is held in the spindle bracket with a bayonet-type lock which permits the spindle to be inserted or removed in a few seconds. The spindle is of a collet-clamping design and can be used with straight shank cutters or standard GA tapered shank cutters.

The machine is equipped with an endless belt drive and has four spindle

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These boxes can now be furnished to defense plants for handling of parts in production and assembly, where used as portable containers.

THE CLEVELAND WIRE SPRING CO.

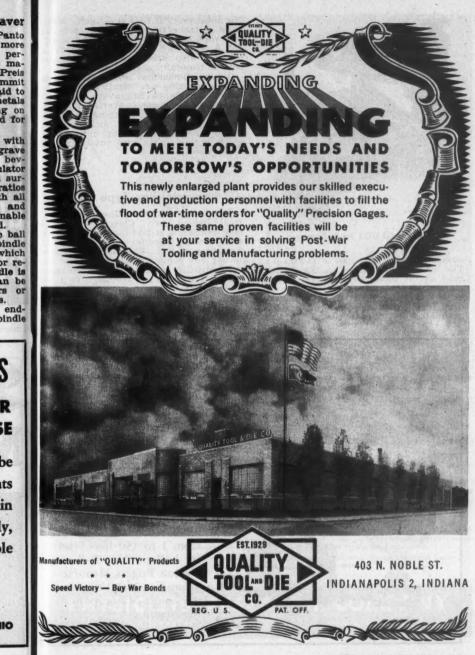
5250 Brookpark Road

Sheet Metal Division

CLEVELAND, OHIO

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Preis Model UE-3 Panto Engraver

speeds ranging from 5,000 to 12,000 r.p.m. The motor is mounted on the base in back of the pantograph carrier and remains in a stationary position. The cutter is fed to the work by a cam-actuated drop lever, the feed-screw collar being graduated in thousandths of an inch.

The total vertical feed is f_6 inch. Maximum distance from the cutter point to the work table is 3 inches. The standard 6 x 12-inch work table, which is provided with three T-slots, is adjustable both horizontally and vertically.

Overall dimensions and working area of the machine are identical with the Model UE Panto Engraver. The machine can be easily converted for electrical marking or acid etching by replacing the spindle bracket with standard Panto marking or etching units which are interchangeable with any of the UE series machines.

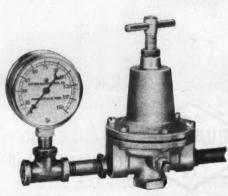
Industrial Box-Type Oven

The Industrial Oven Engineering Co., 11621 Detroit Ave., Cleveland, Ohio is now producing a box-type oven in several standard sizes for a variety of batch heating purposes. The oven is designed to use any commercial oven fuel or can be electrically operated. Door sizes range from 3 feet wide x 5 feet high to 5 feet wide x 7 feet high and working depths, from 4 to 10 feet.

Heating equipment is built into the oven shell, and the oven is shipped as-

Air Regulating Valve

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These new combination regulators and valves are equipped with a special compound spring, which provides sensitive and instantaneous adjustment for all secondary pressures from 1 to 150 lbs. Send for bulletin No. 83-B—Dayton Rogers Manufacturing Co., 2849 12th Avenue South, Minneapolis 7, Minnesota.

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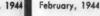
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EMANDS of war have made the Profilometer* a useful gaging device wherever machined parts are produced. Why? Because the Profilometer, by providing a means of measuring surface roughness, enables control of surface quality.

In time of war, control of surface finish is of utmost importance. Time is short . . . the highest production must be maintained. Materials are scarce . . . waste must be kept at a minimum. The Profilometer is helping to meet these requirements.

A Profilometer inspection on intermediate finishing operations will greatly facilitate final finishing of the part to specified dimensions.

A Profilometer readings will show whether parts meet surface-roughness specifications.

☆ Profilometer inspection can prevent waste of valuable time incurred by finishing parts beyond specifications.

☆ Profilometer inspection can prevent waste of materials through scrapping of rejections that can be reworked.



The Profilometer has proved its value in war-production inspection—in the saving of materials, time, and money. There is a moral here, too, for postwar planners.

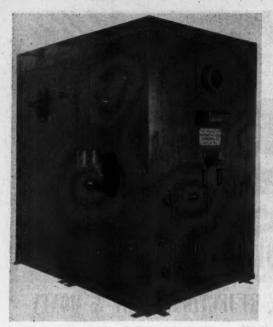
We will be pleased to send you a copy of our recent booklet Practical Measurement of Surface Roughness, a non-technical discussion of surface-roughness measurement with a description of the complete Profilometer equipment.

*Profilometer is a registered trademark indicating Physicists Research Company's brand of surface-roughness gaging equipment.

PHYSICISTS RESEARCH COMPANY

343 SOUTH MAIN STREET

ANN ARBOR, MICHIGAN



plates with heat-affected parts of chrome and chrome-nickel alloys. Ovens can be furnished with or without positive exhaust fan systems, depending upon the processes for which they are to be used.

Standard temperature controls are of the expansion recording thermometer or millivoltmeter types, depending upon the accuracy of control required. Fully electrical safety equipment is said to protect the system against flame, current or air failure.

The Industrial Box - Type Oven can be used with trucks or racks for steel strip dehydrogenizing, aluminum heat treating, stress relieving of N.E. alloys, metal finishing, curing of synthetic resins, tempering and

bluing of steel parts, and numerous other operations.

sembled, ready to operate except for the attachment of accessories. Duct-work is likewise built in and is arranged for cross flow and vertical air passage, af-fording positive and rapid circulation through a relatively dense work load. Recirculation and exhaust ducts are arranged to prevent belching or leaking at the door opening.

One of the principal features of the unit illustrated herewith is close temperature tolerance within limits from 200 to 1,000 deg. F. On high-temperature units, inside panels are made of steel

Henry Model 12 Acceleration **Testing Machine**

The Henry Model 12 Acceleration Testing Machine shown herewith, product of The Paul Henry Co., 2037 S. La Cienega Blvd., Los Angeles 34, Cal., is especially designed for laboratory analysis of the operating characteristics of electrical and mechanical instruments and control devices under accelerations "G," similar to those found in all types of aircraft in flight.

The machine is arranged to handle a



ATKINS Curled-Chip Teeth Engineered for Top Performance on OUR TOUGHEST JOBS! For heavy-duty sawing — for ingot cropping. billet sawing, bar cut-off, and other metal cutting jobs that "kill" ordinary saws — Atkins Curled-Chip

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billet sawing, bar cut-off, and other metal cutting jobs that "kill" ordinary saws — Atkins Curled-Chip Tooth design has been adapted to segmental saws. Shown is an Atkins segment, as it appears before fastening to the blade. The extra advantages of this type of segments are (1) A standard cutting width consistently narrower than other types of inserted tooth saws, (2) Economy—worn-out teeth are easily, quickly replaced without discarding the saw discs, and (3) Great resistance to the shock of-heavy duty work. These, plus the fast cutting, heavy feed rates and accurate cuts assured by Curled-Chip Teeth, make Atkins Segmental Saws your best bet for your toughest jobs. Write for Atkins Curled-Chip Manual for full details.

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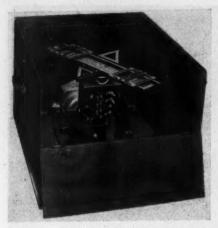
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Henry Model 12 Acceleration Testing Machine

load limit of 5 lb. at 40G and a proportionately increased load up to 15 lb. with a maximum of 15G. The G is read directly on a tachometer dial indicator which is calibrated for a load attached at 10 inches from the center of the table. The load can be placed at any radius

of operation between 0 and 15 inches to obtain different ratios of maximum to minimum accelerations. It can be placed flat or on 90-deg. angle brackets for applying accelerations in any one of six planes. Two sets of mounting plates are provided so that the parts under test can be balanced with an equal amount of weight on the other side of the rotating table to reduce bearing load and prolong machine life.

The Henry Model 12 Acceleration Testing Machine is provided with four electrical terminals on the front panel which are connected through slip rings to the acceleration table. Two of these connections are rated at 200 amperes; the other two at 25 amperes. The machine is driven by a variable speed motor which is designed for operation on 110 volts, alternating current. (Motors for other operating voltages can be obtained on special order.) The current through the motor is controlled by an on-off toggle switch located on the front panel. The speed of the motor is controlled by a lever, also located on the front panel.

es on the drive motor commutator.

The Henry Model 12 Acceleration Testing Machine is 24 inches high, 30 inches wide, 40 inches deep, and weighs approximately 375 pounds.

which changes the position of the brush-

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Greatly increased production of thread grinding which produces a far more accurate and precise thread of superior finish than possible with other methods, may be achieved with Sheffield Precision Thread Grinders. These are the first American designed machines on which either the multi-ribbed or single-ribbed wheel may be used.

The finished thread may be formed in one pass by "plunge cutting" with the multi-ribbed wheel—high production of high quality. Multiple threads are ground in one pass without necessity for precision indexing.

Fine threads can be ground AFTER hardening, especially on thin-walled components, eliminating objectionable stresses and possibility of distortion—also assures thread being held concentric with other ground diameters and threaded sections of work part.

Substantial savings in operating time over conventional machines make it

more economical to grind threads with a Sheffield Thread Grinder. Also because of these savings, it is now feasible to grind threads formerly produced by other methods.

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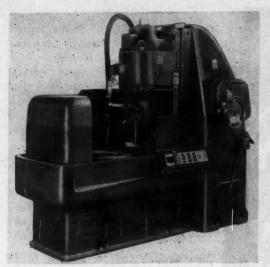
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Hanchett No. 24 Vertical Spindle Rotary Surface Grinder

A vertical spindle rotary surface grinder designated as the No. 24 has been added to the line of large surface grinders produced by the Hanchett Mfg. Co., Big Rapids, Mich. Heavily and sturdily constructed, the machine features a 30-inch rotary magnetic chuck which is equipped with a Neu-T-Rol demagnetizing switch and is traversed into grinding position by push-button control.

The grinding wheel head has hand, power, or automatic traverse, with power being furnished by a 2 h.p., 900 r.p.m. motor. The motor-driven wet grinding system includes a coolant pump driven by a 4 h.p. motor.

by a 1/4 h.p. motor.
Standard equipment of the Hanchett
No. 24 Vertical Spindle Rotary Surface

Hanchett No. 24 Vertical Spindle Rotary Surface Grinder

Grinder includes a rugged swing arm wheel dresser, ammeter for determining the cutting action of the grinding wheel, floodlight, and other accessories which aid in grinding to close tolerances.

Lindberg CF-1 Combustion Tube Furnace

Designated as the CF-1, a combustion tube furnace of modern streamline design for laboratory use is announced by Lindberg Engineering Co., 2444 W. Hubbard St., Chicago 12, Ill. Of the single tube type, the furnace is designed for use in making fast, modern carbon and

ing fast, modern carbon and sulphur determinations as well as in the gravimetric determination of carbon and all alloy steels, including stainless and heat-resisting steels. Temperatures obtainable for continuous operation range up to 2,500 deg. F. while for occasional operations, temperatures up to 2,650 deg. F. are permissible. The high temperature Globar heating elements can be easily installed or removed without total dismantling and assembling of unit.

All necessary controls are conveniently located on the face of the furnace. Temperature regulation is provided by course and fine adjustment knobs connected to built-in variable voltage transformer. An ammeter shows the proper and safe current required for the Globar heating elements, while temperature is indicated by a pyrometer which is connected to a platinum thermocouple. A



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and preloaded precision bearing assure accuracy at all speeds. Center point runs true and stays true.

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TYPE A-STEP JAW DESIGN

Especially adapted for holding work with short bores while being machined between centers on lathes, grinders, millers, shap-

Size No.	Range of Bores Taken	Net Price
1A	1/2" to 1"	\$12.00
2A	1" to 11/2"	16.00
3A	1 1/2" to 2"	23.00
4A	2" to 3"	34.00
5A	3" to 4"	40.00



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Adapted for work with both short and long bores.

Size No.	Range of Bores Taken	Net Price
1X	1/2" to 18"	\$10.00
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00	3/4" to 7/4"	14.00
0	%" to 1"	16.00
1	1" to 11/4"	18.00
2	11/4" to 1 18"	21.00
3	1 % " to 2"	29.00
4	2" to 21/2"	40.00

(Other Sizes Taking Up to 7" Bores)

Hardened tool steel, accurately ground. Sold singly or in sets. Prompt delivery. Write for bulletin No. 1043.

knob for controlling flow of oxygen operates a needle valve connected to rubber tubing adapters located at both ends of housing for convenient piping to oxygen supply. A line cut-off switch and a signal light which shows when furnace is operating are included with the control.

The Lindberg CF-1 Combustion Tube Furnace is equipped with three adapters for easy and quick interchangeability of standard combustion tubes of 1, 14, and 14 inches outside diameter. A fourth tube, 2 inches outside diameter, can be used without an adapter. The furnace,



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Lindberg CF-1 Combustion Tube Furnace

which is 171/2 inches long x 15 inches wide x 211/2 inches high, is designed for operation on 60 cycle alternating current at 110 or 220 volts. Units for operation on 25 cycle current can also be supplied.

Thor Portable Pneumatic Auto "RIV-Driver"

Said to drive four blind rivets a minute in aircraft production, a portable pneumatic tool to be known as the Thor Auto "RIV-Driver" is announced by Independent Pneumatic Tool Co., 600 W. Jackson Blvd., Chicago 7, Ill. Ac-cording to the manufacturer, the tool will drive and buck in one speedy operation blind rivets on finished plane sections to which are connected de-icers, instrument panels, and other light assemblies.

GET BIG PRODUCTION FROM UNSKILLED WORKERS! Every dollar invested in

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POWER TOOLS

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You'll Be Amazed at the Performance of the **BOICE-CRANE No. 2600** HELMET HEAD DRILL PRESS

Over 75 Models

One, two, three and four spindle types. High and slow speed; bench or floor type; slotted or oil trough table. Perfectly balanced. Vibrationless.

Sealed against hazards common in other presses. The only drill press under \$100.00 with an approved guard included as standard equipment; the first guard that allows easy speed changing.

Five carefully predetermined efficient speeds, one for every operation. New self-centering 30-degree pressure angle 6-tooth involute spline. Spindle, quill, and spindle-pulley are held in permanent, perfect alignment.

The longer, larger diameter quill is supported in head by three long bearings, permitting more accurate deep hole drilling than by other presses in same price range. The most durable, sensitive press in its class.



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For Helmet Head Drill Presses

Do light tapping better, cleaner, more economically. Operate at 3000 r.p.m. "IN"; faster than others, and 6000 r.p.m. "OUT". Taps enter every hole centrally and without slightest strain. 2 sizes. Fewer broken taps.

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DRILL SHAPERS SPINDLE SANDERS

February, 1944

MODERN MACHINE SHOP

The Thor Auto RIV-Driver operates in a fast four-step cycle and features a light at the top of the handle which flashes "OK" to indicate to the opera-



Thor Portable Pneumatic Auto "RIV-Driver"

tor when the rivet has been accurately upset on the blind side. The first step in the cycle consists of screwing a mandrel into the rivet. During the second step, the mandrel is pulled back, upsetting the rivet and flashing on the "OK" light. The third step consists of unscrewing the mandrel and the fourth, shutting off the tool, thus completing the cycle and making the tool ready to

perform the next operation.

Weighing only 4½ lb., the Thor Portable Pneumatic Auto RIV-Driver measures 9½ inches in length, has a spindle offset of % inch, and a speed of 1,000 r.p.m. forward and 2,000 r.p.m. reverse. The tool is not only said to be ideal for the production application of blind rivets in building aircraft but in fabricating a variety of other assemblies.

Diamond Hand Hone

A diamond hand hone which is said to maintain a flat honing surface over an unusually long period of use without scoring, grooving, or chipping has been developed by the Diamond Tool Replacement Co., Division of Oscap Mfg. Co., Inc., 207 W. Saratoga St., Baltimore 1, Md. With the diamonds set in a hard metal bond, the hone is claimed to solve the problem of keeping sharp the cutting edges of high speed steel as well as the hardest grades of cemented carbide-tipped tools.

According to the manufacturer, men or women workers can readily keep tool cutting edges sharp and keen with a few simple strokes of the hone, which



WHY?

MANUFACTURED

J. MILTON LUERS

12 PINE ST.

MT. CLEMENS, MICH.

Produced under License issued by John Milton Luers Patents Inc.

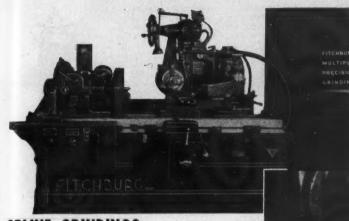
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SPLINE GRINDING?
SPLINE SHAPING?
INTERNAL GEAR GRINDING?
EXTERNAL GEAR GRINDING?

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.... Do all four on the Fitchburg Gear Grinder

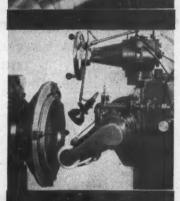
A single Fitchburg Gear Grinder, with special attachments will

GRIND internal or external, helical or spur gears
— straight, taper and helical splines, and
will also

SHAPE straight, taper and helical splines.

A leading automobile manufacturing plant now engaged in making airplane engines, is using Fitchburg Gear Grinders with Special Wheelheads in the important operation of grinding internal gears. They give highest praise to its accuracy, fine finish and high production at low cost.

You can get the same results on a variety of work—on this one machine—why not let Fitchburg engineers show you how. Write today.





BURG GRINDING MACHINE CORP.

FITCHBURG, MASSACHUSETTS, U.S.A.

Manufacturers of — Bawgage Wheelhead Units, Multiple Precision Grinding Units, Spline Grinders, Cylindrical Grinders, Gear Grinders, Bath Full Universal Grinders and Special Purpase Grinders

is also designed for use in removing seams and burrs, eliminating featheredging, beveling and rounding edges, and the flat and radius honing of single and multi-pointed, circular and flat form



Digmond Hand Hone

tools and cutter bits, high speed steel or cemented carbide.

The diamond hand hone is available in three grades of honing surface—dne (320 grit), medium (220 grit), and coarse (100 grit).

Ruthman Model 1-P3 Belt-Driven "Gusher" Coolant Pump

The Ruthman Machinery Co., 1817 Reading Rd., Cincinnati 2, Ohio, announces the addition of a belt-driven pump designated as the Model 1-P3 to its line of "Gusher" coolant pumps. The unit is designed for operation in a vertical position and is propelled by a No. A V-belt from a motor or drive shaft.

The construction of the Model 1-P3 pump includes a one-piece shaft which revolves on two high grade ball bearings mounted within the tubular section be-tween the plate flange and the Vpulley. The pump stem, flange, and impeller are available in two lengths and are inter-changeable with corresponding parts of Gusher motordriven Model 1-P3



Ruthman Belt-Driven
"Gusher" Coolant
Pump

Sanford Portable Mounting Table

Suitable for any bench type machine, the Sanford Portable Mounting Table shown herewith, product of the Sanford



Get all the benefits of new electrified equipment with

MASTERDRIVE

- 1. Increase tool efficiency at low cost.
- 2. Eliminate lineshaft hazards.
- 3. Permit flexibility of plant layout.

Masterdrives are available to 750 tool drive specifications, including grinder drives suitable for Heald, Norton, Cincinnati, Rivett and many other machines. Simple to attach, operate and maintain, yet they offer the advantages of new electrified equipment at used machinery cost. A single complete installation with Master Gear Head Motor — one responsibility. Write today!



MASTER ELECTRIC CO.

BRC



BRONZE SLEEVE BEARINGS - STANDARD SIZES OR TO CUSTOMERS BLUEPRINT IN ANY RECOGNIZED BEARING METAL ANALYSIS



America's Unbeatables

Yes, all the wheels in our line are small, but powerful and swift tools of war doing their stuff day in and day out—making it possible to speed through everything that requires precision internal or external grinding, polishing and burring—bombsights, planes, tanks,

guns, intricate instruments, etc.

TEST WHEEL FREE -

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So that you will know what Chicago Wheels can do, we'll gladly send one without charge. Tell us material you want to grind and size wheel you'd like.

Send the Coupon for Illustrated Catalog

CHICAGO GRINDING WHEELS-TO break production bottlenecks due to the crains need for small wheels, we gave up making all larger, these for the duration—with but WPB approval—and now specialize on sizes 3" in diameter and under. 00 sizes. to suit PROMPT DELIVERY—Come to America's Headquarters for

Small Wheels, custom built to your order. No waiting for shipments now, and after the war a reliable source of supply. Our central location is another asset—cuts shipping time to most plants.

CHICAGO WHEEL MFG. CO. 1101 W. Monroe St., Dept. MM-2, Chicago 7, Ill.

· Half a century of specialization has established our reputation as the Small Wheel People of the Abrasive Industry.

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The vibrations caused by the couple-force action of Dy-Namic Unbalance in rotating parts is the Unseen and often Undetected Enemy of precision, efficiency and long life. The new Bear Bulletin brings you the facts about this New Development which has received

such impetus since
the introduction of the simplified,
easier-to-operate, lower-cost Bear
Machines.
WIRE, PHONE, WRITE details of
your problem; and send for copy of
NEW BULLETIN. Bear Mfg. Co.,
Dept. MMS, Rock Island, Illinois.

oln One Operation Shows Static Dy-Namic and Static Dy-Namic.

Indicator Diale—Calibrated to indicate angular

Adjustable Bed
 — Permits balancing of many
sizes and types
of bodies on one
machine.

ance.

position of unbal-

Mfg. Co., 1279-81 Springfield Ave., Irvington 11, N. J., is sturdily constructed and measures 33 inches in height. The table is provided with a heavy wooden top 20 x 34 inches and a wooden shelf 12 x 20 inches. The legs are made of cast iron, with wheels side-mounted on



Sanford Portable Mounting Table

two legs so that the entire table may be easily moved by merely raising the lifting handle to a horizontal position. All wooden parts are heavily varnished.

Engineers'-Glass and Transparency Holding Fixture

Designed for use on Jones & Lamson 14-inch pedestal or bench type comparators, the Engineers'-Glass and Transparency Holding Fixture illustrated herewith is announced by the Engineers' Specialties Division, The Universal Engraving & Colorplate Co., Inc., 588 Monroe St., Buffalo, N. Y. The fixture is made to accommodate and enable the operator to center Engineers'-Glass, Engineers'-Transparencies, screw thread charts, and radius charts 10 x 12 inches, 11 x 14 inches, and 10½ x 16 inches. The bar upon which the chart rests is of seasoned mahogany, stained black with a dull shellacked finish. The metal parts, excepting two retaining screws, are of brushed brass.

The Engineers'-Glass and Transpar-

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GAM MONS REAMERS

Manufacturers of

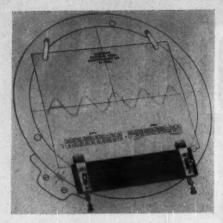
The Gammons Helical Taper Pin Reamer
The Gammons Helical Chucking Reamer
The Gammons Helical Die Makers Reamer
The Gammons Duplex Taper Pin Reamer

Special reaming problems invited Send for Catalog

THE GAMMONS-HOAGLUND CO.

MANCHESTER

CONNECTICUT



Engineers'-Glass and Transparency Holding Fixture

ency Holding Fixture can be easily attached to the comparator by removing the two screws holding the lower spring clips of the comparator and inserting in their places two screws which extend through the mahogany rest bar of the holding fixture. Vertical adjustment is

effected by two screws with knurled heads which extend below the holder. Horizontal adjustment is easily made with the fingers. Two knurled nuts can then be tightened and the rest bar and chart locked in position. The fixture is so constructed that the chart and fixture remain together as a unit when removed from the comparator.

Sav-Way Master Setting and Checking Rolls

A set of master setting and checking rolls for the checking of micrometers, snap gages, and other precision inspection and gaging instruments is announced by Sav-Way Industries, Box 117, Harper Station, Detroit 13, Mich. The set consists of 20 individual rolls ranging from 0.100 to 2.000 inches in diameter. The rolls are hardened, ground, and lapped to gagemakers' X tolerance and are deep frozen before finish grinding to eliminate internal strains and provide accelerated aging.

Sav-Way Master Setting and Checking Rolls are designed to provide a convenient means for accurately checking an



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IDEAL Combination Combination for Faster production Longer TOOL LIFE

LIVE CENTERS

Enable you to work with heavier loads, make deeper cuts at higher speeds because they rotate with the work. Precision bearings built for close precision work. Four Interchangeable Inserts Available.

"AC" MAGNETIC CHUCK

Combines Magnetic Chuck with "AC" Rectifier.

Operates from any electrical outlet. Holds work rigidly without clamps or vises.

ELECTRIC TACHOMETER

Checks RPM instantly. Used as "Hand Type" or with generator separated from meter as "Separable Type." Two Sizes—0 to 2500 RPM and 0 to 5000 RPM.

DEMAGNETIZER

Keeps Tool Sharp Longer. A single pass across the demagnetizer removes metallic dust, flakes, fine chips, etc. Powerful—Portable.

FREE...Machine Tool Accessories Catalog, gives information on these and many other Time-Saving Tools.

IDEAL Sycamore * IDEAL Sycamore

1031 PARK AVENUE SYCAMORE, ILLINOIS
Sales Offices in All Principal Cities

In Canada: Irving Smith, Ltd.; Montreal, Quebec.

THEAL



Sav-Way Master Setting and Checking Rolls

instrument throughout its entire range at one time. In addition, the rolls are said to be extremely useful in setting up jobs where dial indicators and amplifiers are to be employed.

The set is housed in a modern transparent plastic case which not only provides necessary protection but also affords a clear view of the contents, thus ensuring that all rolls are in place when the set is returned to the tool crib.

P&H Model WP-2 2500-Lb. Capacity Welding Positioner

In the line of P&H welding positioners now being introduced by the Harnisch-feger Corp., Milwaukee 14, Wis., is the 2500-lb. capacity Model WP-2 positioner shown herewith. Featuring flexibility of use. simplicity, and easy operation, the unit is designed for production-line welding, as well as job and maintenance work, and so on. As in senior models, construction throughout is all-welded rolled steel.

The table is 42 inches in diameter, has 18 handy radial slots for mounting fixtures, and is arranged for turning manually to suit welding speed. Tilting is controlled by hydraulic power, with a 135-deg. beyond horizontal position attainable. Both table movements include positive locking arrangements.

Telescopic column with self-locating stops provides for table elevation of from 28 inches minimum to 60 inches maximum from floor, depending on type of mounting. Portable or column-infloor mountings are available.

According to the manufacturer, the design is marked by sturdy and safe construction of all parts. For example, the removable table is held to platen by





GEARSHIFT DRIVES FOR MACHINE TOOLS REQUIRING SELECTIVE SPEEDS...

1 to 25 H.P.



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> Large enough to successfully serve you, yet small enough to give personal attention to your needs.



THE LIMA ELECTRIC MOTOR CO.

174 FINDLAY ROAD

LIMA, OHIO

REPRESENTATION IN MOST PRINCIPAL CITIES

LIMA GEARSHIFT DRIVES - LIMA ELECTRIC MOTORS LIMA MAGNETIC POLISHING LATHES - LIMA PEDESTAL GRINDERS



MARKING

PART NUMBERS



MARKING BY ROLLING IS FAST AND ECONOMICAL.

PRESERVES DIE LIFE AND PIECE PARTS.

REQUIRES
ONLY FRACTION OF
APPLIED
PRESSURE
AS COMPARED TO
STAMPING.

QUICK SET-UPS

MODEL 25 HI-DUTY MARKING MACHINE

This machine operates from your plant air line, and is one of numerous models built to produce test, neat marking on metal parts. Hi-Duty marking machines may be had for practically any marking operation, and we will be glad to make recommendations upon receipt of your inquiries. Send prints or samples of parts to be marked, showing lettering and location, also state required production.

GEO. T. SCHMIDT, Inc.

1806 BELLE PLAINE AVE. CHICAGO 13, ILLINOIS 10 heavy bolts. The platen index is welded integrally with king-pin which is held in position by large safety lock nut. No gearing is exposed.

Available extra equipment includes electric power or ring gear and hand-wheel assembly for turning table with foot or push-button control; higher than standard columns in increments of one foot; and roller equipped outboard supports for handling long or large weld-



P&H Model WP-2 2500-Lb. Capacity Welding Positioner

ments. Equipment for power rotation of table at constant speed of 1 r.p.m. may also be obtained, and all table assemblies are readily interchangeable in the field.

Herman 5,000-Lb. Precision Granite Surface Plate

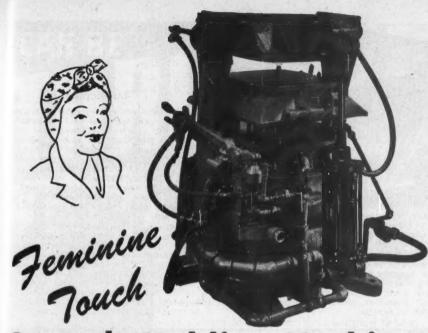
The accompanying illustration shows a 5,000-lb. precision granite surface plate produced by The Herman Stone Co., 1238 Leonhard St. at B. & O. R. R., Dayton 4, Ohio. The plate measures 4 x 6 feet and is provided with a special steel angle iron wheel carriage which allows for ease of handling and makes the plate readily available for service in any part of the plant.

Like its smaller counterparts, the plate

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Controls Molding Machines



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NOPAK Jolt-Squeeze Valves are standard equipment on many molding machines, and may be used in the control of other types of machine movements, See Bulletin 86.

On the Tabor Power Squeeze, Flask Lift Molding Machine, a NOPAK Model E, $4\frac{1}{2}$ " Air Cylinder moves the 350 lb. head into position for the squeeze, then moves it back so the finished mold can be removed, and a new flask inserted.

Eliminating strenuous manual effort from this particular machine movement has made it possible to employ women on these machines... has speeded up the molding cycle to meet war production needs. A battery of these machines is production-molding piston rings for airplanes in a large, well-known foundry. Perhaps NOPAK Cylinder Power can help you speed up movements on your machines. Write for Bulletin 82-A.

GALLAND-HENNING MFG. CO., 2758 S. 31st St., Milwaukee 7, Wis.

Representatives in Principal Cities

VALVES and CYLINDERS

DESIGNED for AIR or HYDRAULIC SERVICE

A 4303-1P-A E SHOP 265



Herman 5.000-Lb. Precision Granite Surface Plate

"Lubricoolant"

A combination lubricant and coolant which is said to provide for greatly increased tool life in performing a variety of operations, including cutting, grinding, facing, boring, drill-ing, threading, deburring, key seating, and other operations, to be known as "Lubricoolant,"

has been placed on the market by The DuBcis Co., 1120 W. Front St., Cincin-

nati 3, Ohio.

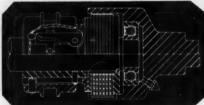
In addition, this product is said to hold work at approximately room temperature during machining, eliminate "dry welding" of chips to the cutting edges of tools, and allow for the use of unusually high working speeds. Lubricoolant also enables a mirror-like finish to be obtained on work and, being transparent, facilitates the performance of accurate machining operations.

presents a smooth, non-magnetic, glasslike surface. According to the manufacturer, both this plate and an even larger 6 x 8-foot size may be finished to an accuracy of 0.0003 inch, while standard smaller sizes are held to an accuracy of 0.0001 inch.

Since it is claimed to be harder than the hardest tools, as well as rustproof and warp-proof, this huge granite surface plate is practically indestructible and, therefore, should provide a maximum of service.

How PULLMORE CLUTCHES Help Eliminate Plain Bearing Drag —

This single type, dry PULLMORE Multiple Disc CLUTCH application has a grease-seal ball bearing-which eliminates the drag that is present when a plain bearing is used. The PULLMORE Multiple Disc-CLUTCH has several exclusive advantages that improve the performance of machines in which they are used. Let our engineers suggest how PULLMORE CLUTCHES will help you get the lump on competition.





Rockford Drilling Machine Division Borg-Warner Corporation



300 Catherine Street, Rockford, Illinois, U.S.A.



CAN BE THE CONTROL OF THE STATE
GUSHER COOLANT PUMPS

... and less power is consumed when Gusher Coolant Pumps are either partially or totally throttled. Easy adaptability for quick change-overs. No packing glands to leak, consume power or require adjustment. Learn about other advantages of Gusher Coolant Pumps. There's a model and type for your needs. Write for new complete catalogue.

Model 9040—Available in any current characteristics, including 25 cycle, 1, 2, or 3 phase. Totally enclosed ¼ h.p. motor.

Model 9040

THE RUTHMAN MACHINERY CO.

LARGEST EXCLUSIVE BUILDERS OF COOLANT PUMPS

According to the manufacturer, Lubricoolant is completely free from objectionable odors and its use eliminates dermatitis.

Decora Air Duster Blow Gun

The Decora Air Duster Blow Gun illustrated herewith, product of the Decora Mfg. Co., 1823 5th St., Berkeley 2,



Decora Air Duster Blow Gun

Cal., is claimed to be a very efficient tool for instantly removing metal filings, chips, grit, and moisture from machinery, as well as for cleaning shop equipment and benches. The design of the gun makes it particularly useful for cleaning out cracks and confined areas.

The nozzle of the gun is in direct line with the air hose, thereby affording an unobstructed flow of air. The trigger is of a lever type which provides positive and graduated control of air volume. The trigger also serves as a hook for hanging the tool and hose in an accessible location.

Constructed of steel and brass and attractively finished, the Decora Air Duster Blow Gun is available with a choice of either 5/64 or ½-inch nozzle orifice. If desired, the air washer can be readily replaced by a standard Schrader chuck washer.

G-E Spotlight for Arc Welding Operators

A spotlight which is designed to provide glareless illumination of sufficient intensity for an arc welding operator to see his work distinctly through the dark lens of a welding helmet prior to striking the arc is announced by the Electric Welding Division of the General Electric Co., Schenectady, N. Y. The spotlight is said to be especially desirable for production-line welding in which the estab-



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PRECISION instruments by Millers Falls are at work today on the many new precision jobs that war has created. Our weapons must be right, to the close tolerances that assure their effective operation in combat.

Thus precision becomes an ingredient of Victory. One of the invisible qualities of a weapon that may spell the difference between a battle won or lost.

One in Quality - Now One in Name

You knew these same fine instruments under the name of Goodell-Pratt. For generations, that name stood for quality and precision in a tool. But since the union of Millers Falls and Goodell-Pratt in 1931, Millers Falls has been producing these instruments.

So the trade name that appears on them is that of Millers Falls. The quality is the same. Only the brand name is changed.

War's demands have created substantial increases in Millers Falls' production capacity. So these fine instruments, and other excellent tools in Millers Falls' wartime line, represent unusual values in tools that deliver long, dependable, accurate service. Write for details.

Calipers and Dividers • Feeler Gages • Surface Gages • Micrometers • Depth Gages • Combination Sets • Steel Rules

MILLERS FALLS COMPANY

Greenfield, Mass., U. S. A.



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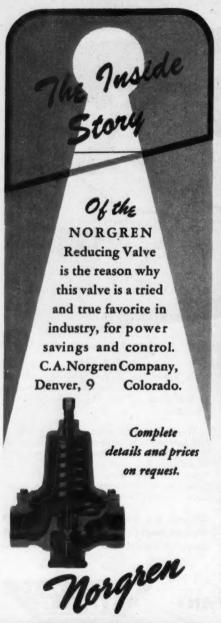
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lishment of the arc must be made quickly and accurately, such as in the welding of thin materials, light alloy castings and aircraft parts

ings, and aircraft parts.

According to the manufacturer, the G-E Spotlight is designed to increase production by saving time and reducing operator fatigue, since it is not necessary for the operator to lift his helmet before striking the arc. It is also said

to reduce spoilage of exacting work be-



G-E Spotlight for Arc Welding Operators

cause the operator can strike the arc precisely where required.

Mounted on an upright, telescoping metal standard which is firmly set in an 18½-inch diameter 30-ib. cast iron base for stability, the spotlight consists of three 30-watt reflector spot lamps surrounded by a circular shade. Rated to give 1,000 hours of continuous operation at 120 volts, the lamps are mounted in adjustable porcelain holders so that the area covered by the light beam can be increased from a single sharp spot 7 inches in diameter to a clover-leaf shaped pattern approximately 17 inches across at its widest point.

The light can be raised or lowered on its standard and held firmly in place at any point from 45 to 76 inches from the base by a locking thumbscrew. A uniTHE



SAFETY'S NEW NO. 277 GRINDING WHEEL

If you work with National Emergency Steels — if production and efficiency and economy are vital factors in your plant—then by all means investigate the new No. 277 Safety Grinding Wheel. Here is a wheel with a sensationally NEW BOND—a bond developed especially for centerless and cylindrical precision grinding of National Emergency Steels. Greater latitude of operations is provided . . . assur-

ing faster grinding — improved cutting action better finish. There is a specific No. 277 Safety Wheel for every National Emergency Steel grinding job. Write us today for illustrated folder and full details on how the No. 277 Wheel is helping to break production records in scores of important war plants.

THE SAFETY GRINDING WHEEL AND MACHINE COMPANY

Main Office and Factory SPRINGFIELD, OHIO, Phone 4651

® Birmingham—3-3323 ★ Chicage—BRUnswick 2000 ★ Cieveland—CEdar 9292 ★ Detroit—TOwnsend 8-4740, ★ Piltsburgh—COurt 2822 ★ Erie—25-867 ★ Philadelphia—WAlnut 3132 ★ 51. Loois—CEntral 3787 ★ Syracuse—3-2191 ♠ Milwoules—Bloomood 6742

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e 7 versal friction ball-joint permits the light beam to be directed and held at any angle downward between vertical and 30 deg. below horizontal. Controlled by a foot-operated switch,

the unit is equipped with a 10-foot, oilproof, heavily-jacketed cable with plug for connecting the light to the electric circuit. The entire unit, except for the inside telescoping section of the standard, has an attractive black crackle finish and is furnished completely wired and ready for operation.

F & H Sliding Pin Drive Floating Toolholder

Designed to automatically compensate for machine spindle misalignment, a for machine spindle misalignment, a floating toolholder with sliding pin drive is announced by F & H Mfg. Co., 10338 Gratiot Ave., Detroit 13, Mich. The holder is equipped with three sliding pins set angularly in three equal spaces to provide correct floating at all times. The F & H Sliding Pin Drive Floating Toolholder is adaptable to machines for single and multiple-spindle temping.

for single and multiple-spindle tapping,



F & H Sliding Pin Drive Floating Toolholder

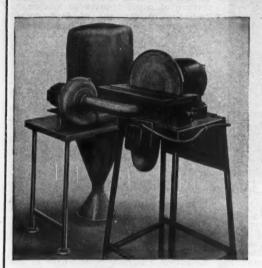
reaming, counterboring, and thread-cutting with adjustable die heads or solid dies. The holder is available with shanks to fit all makes of machines.

Lever, Rack and Pinion Transverse Feed for Nichols Miller

A lever, rack and pinion transverse feed arrangement for the Nichols Milling Machine is announced by the Nichols-Morris Corp., 50 Church St., New York, N. Y. This feed can be substituted for the regular transverse feed screw to provide increased operational flexibility.



Februa



STOP **BREATHING** DUST Prevent Illness

VERY FINEST DUST PARTICLES ARE THE DANGEROUS ONES!

Unit Dust Collector on Sand Wheel

USE LEIMAN BROS.

UNIT DUST COLLECTOR

... ON ...

Surface Grinders, Lathes, Saw Machines, Belt and Wheel Sanders, Grinders, Sand Blasts, Etc.

For I-6" Wheel up to 2-24" Wheels. 600 c.f. air minute up.

LEIMAN BROS. 168 Christie St. Newark, N. J.

Unit Dust Collector on Surface Grinder



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Lever, Rack and Pinion Transverse Feed for Nichols Miller

According to the manufacturer, the main advantage of the rack and lever transverse feed is that it gives to the milling machine table and saddle the same flexibility of movement found in the conventional lathe carriage and cross slide. Work can be chucked lathe fashion on the spindle with tools mount-

ed on the table, or vice versa. This feature of rapid transverse motion, together with the use of high spindle speeds and carbide-tipped tools, enables the Nichols Miller to be adapted to boring, facing, counterboring, turning, profiling, and recessing operations. Close tolerances can be held on repetitive operations by means of adjustable stops. For extremely close work, dial indicators can be mounted on convenient finished surfaces.

In addition to the afore-mentioned advantages, the Nichols Miller, when equipped with a lever, rack and pinion transverse feed, is said to occupy a minimum of floor space and to provide the operator with maximum visibility of the work and more convenient working

position.

Televiso Model No. 2 Strain Gage **Amplified Analyzer**

Manufactured by Televiso Products Inc., 6533 N. Olmsted, Chicago 31, Ill., the Televiso Model No. 2 Strain Gage Amplified Analyzer shown here is used to analyze and indicate on a recording oscillograph, strains in mechanical members such as railroad rails, beams, and



THE MACHINE ILLUSTRATED

is a 4-Spindle Hydraulic Machine, equipped with four pump-type jigs for Line Boring . . . Piston-Pin Hole in piston.

NCE TOOL & DIE CO. Detroit 11, Mich.

7356 St. Aubin,

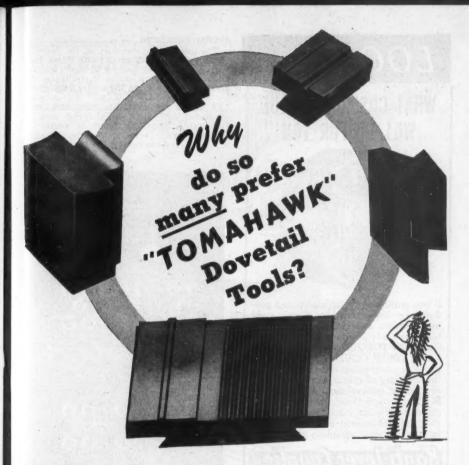
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We would really like to know the answer ourselves. The facts in the case are that Genesee today is one of the Nation's major producers of Dovetail tools just as it is among the leaders in the production of many other types of special tools.

It may have something to do with jealous maintenance of quality-though

we know other companies make good tools too. It may have something to do with deliveries - though we haven't been too happy at times in the past when we looked at our banks of unfilled orders. Somehow "price" can't be the answer, for we have never sacrificed quality for the sake of price.

Perhaps it's just a combination of all of them. If you know, won't you tell us?

We welcome your comments and inquiries.



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GENESEE TOOL COMPANY FENTON, MICHIGAN



LOOK---

WHAT CUSHION TORQUE WILL DO FOR YOU

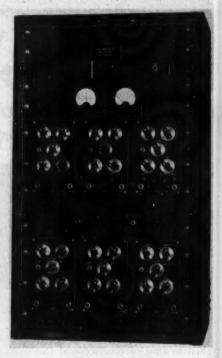


If you want steady, uninterrupted production - lower machine-repair costs and freedom from misalignment troubles, take advantage of the long-lived CUSHION TORQUE developed by the KANTI-LEVER COUPLING. It not only protects you against misalignment like the ordinary coupling, but it goes several steps further and cushions your Motors and Productive Machines against the wear, vibration and fatique that are the source of most machine failures. No other coupling is like the-

It has a circular series of laminated, resilient Contilevers of 200,000 lb. steel operating in taper-side slots. End thrust is impossible: leverage on the cantilevers decreases automatically with increased load: safety stops prevent damage from extreme overloads: special end-float obtainable up to four inches without increase in cantilever stresses: outer periphery can be used as a brake drum for quick-stopping machinery. Over 3,000,000 H.P. in service. Send for Bulletin No. 28-M.

similar structures.

The instrument consists of six individual direct coupled amplifying units featuring individual master bridge circuits, thus making it possible to indicate the strains produced on structural members by six individual pickups. All outputs and inputs are available from the front of panel and each amplifying unit is removable from the front of panel by loosening four screws, thereby making it possible to conveniently check calibra-



Televiso Model No. 2 Strain Gage Amplified Analyzer

tion or service the instrument in the field.

The Televiso Model No. 2 Strain Gage Amplified Analyzer has a built-in tentube regulated power supply holding the plate voltage and filament voltage to a variation of one per cent. A d.c. volt-meter is connected in the circuit at all times and a zero center milliammeter is used with a patch cord for initial balance of output plate current before the recording oscillograph is employed.

MODERN MACHINE SHOP

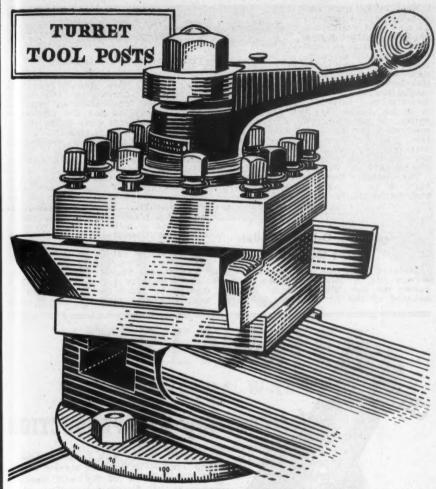
February, 1944

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McCROSKY TURRETS enable the engine-lathe operator to set up at one time all the tools required for a multiple-operation job. Indexing is easy and accurate, and extreme rigidity is provided by the locking mechanism. Five styles (including a small bench-lathe turret) and several sizes in each style. For turret bulletin write to McCrosky, Meadville, Pa.

McCROSKY TOOL CORPORATION

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ers uts ont is by ing Each strain gage amplifying unit contains six t u b e s and features a chromium-plated chassis and metal parts to resist corrosion. All adjustments on each amplifying unit can be locked by dial

thumbscrew locks to prevent change of calibration from external vibration. The direct current output on each amplifier is 20 Ma. linear over the whole scale within one per cent. The units may be used with any standard recording system. The frequency response of each unit is linear within one-tenth of one per cent from 0 to 40 kc. Gain in decibels of each unit is 90.

The complete instrument is 36 inches high, 20 inches wide, 18 inches deep, and weighs 150 lb. Power, 115 a.c.

Turner "Plast-O-Lock" Collet-Type Gage

Designed to provide for unusually long service life, a collet-type gage to be known as the "Plast-O-Lock" is announced by the Turner Gage Grinding



Turner "Plast-O-Lock" Collet-Type Gage

Co., Ferndale, Mich. Simply made, the gage consists of two plugs, two collets, and a holder. The collets are made of plastic and are slotted and tapered to fit into the tapered ends of the holder, which is also made of plastic. The collet on the "no go" end of the gage is red plastic.

Hand pressure on the collets is said to be sufficient to lock the plugs in the holder, and a partial turn of an end wrench unlocks the collets to reverse the plugs or reset them at any desired protruding length. Since the collets are made of a plastic material, marring of the lapped or polished plug surfaces is said to be eliminated. As the plugs are worn beyond allowed tolerances, they may be simply cut off, thus leaving an unused section reading for gaging.

The Turner Plast-O-Lock Collet-Type Gage is made in plug sizes from 0.050 to 0.690 inch. Since the "go" end of the gage normally receives more surface



give is responsible for the swift, steady increase in their use. Quality of diamonds employed plus a unique method of setting assure extreme rigidity and extra tool life. Special tools made to order following blueprints or specifications. Sharppointed, selected thread grinding tools. Ask your dealer or order direct. Request free literature.

BEVERLY HILLS, CALIFORNIA

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WRENCHES

WEAPONS OF WAR

"Men of Billings" know their daily production is their weapon of war. Production schedules and assembly lines depend upon it. Each day more and more Billings Wrenches reach the spot where they are needed most, and every one of them is doing it's job with typical Billings dependability - helping to win the war.

BILLINGS ALWAYS HAVE BEEN GOOD

BUY U.S. WAR BONDS HARTFORD, CONN.,...

MODERN MACHINE SHOP

279

wear than the "no go" end, the gage is available with "go" plugs from 1% to 3% inches long and "no go" plugs from 1% to 2% inches long. The gage can be furnished with -regular steel, chrome plated, or Carboloy plugs.

Shearcutter Boring Bit

A boring tool having a circular cutting edge that is said to retain its sharpness over a very long period of use, to be known as the Shearcutter Boring Bit,

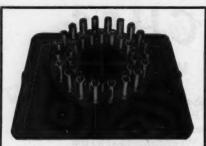
New Nesting Type Tote Pans



20" long x 12" wide x 61/2" deep. 16 ga., drag holes and handles both ends.

J. L. LUCAS & SON, INC.

Bridgeport, Conn.



Pictured: a 38-Spindle Heavy-Duty Drill Head.

DESIGNERS AND MANU-**FACTURERS OF MULTIPLE** DRILLING EQUIPMENT.

We invite your inquiry.

has been developed by the Shearcut Tool Co., 19600 Sherman Way, Reseda, Cal. The shearing action of the tool produces a curled chip and allows for heavy cuts



Shearcutter Boring Bit

to be taken without chatter, it is claimed. Chips sliding back over the cutting edge are said to have a resharpening action. When an edge becomes dull, a new one is provided by simply turning the bit in the holder.

Designed for cutting speeds up to 1,000 feet per minute, the Shearcutter Boring Bit is said to generate a minimum of heat because of the shear cutting action, and to produce, in one operation, a mirror finish that meets Navy specifications and usually eliminates the need for subsequent grinding, filing, reaming, or polishing operations to remove tool marks. According to the manufacturer, the tool operates equally well with a positive or negative rake and allows for working to unusually close limits.

"Permaloy" Diamond Mounting Alloy

An alloy for mounting or setting diamonds in tools used for truing, cutting, boring, turning, broaching, thread cut-ting, and so on, to be known as "Per-maloy," is now being introduced by E. Karelsen, Inc., 125 W. 45th St., New York, New York.

Through the use of this alloy, dia-monds are said to be held viridly indef-

monds are said to be held rigidly indefi-

WE INVITE YOU TO TRY

The World's Best Rubberized Abrasives for Fine Grinding, Polishing and De-burring. Attach this advertisement to your card or

letterhead for literature.

CRATEX MFG. CO. M San Francisco . Calif.

MODERN MACHINE SHOP

February, 1944

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WHEN THE LIGHTS GO ON AGAIN all over the world, war-acquired precision will turn spotlights on those manufacturers who apply the benefits gained by using WESSON Carbide Cutting Tools...to machine the modern tougher metals better, at less cost...with fewer, simpler set-ups...with bigger bites of metal at greater speeds ...with greater precision, finer finishes...for the good of all humanity and a better world in which to enjoy peace!

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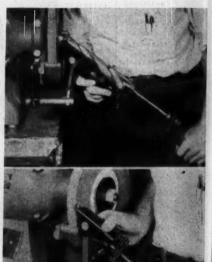
When the war is won—Americans will enjoy higher standards of living than ever before. Motor cars, airplanes, trucks and tractors, home appliances, every machine and tool that's made of metal, will be better, safer and stronger. JKS Diamond Wheels will help to make this possible by processing tougher metals, with greater precision. Far-sighted companies are already designing new products, scanning new outlets and perfecting plans for cutting their costs with improved machine tools. To such executives this is an invitation to write today to—



nitely, irrespective of the heat generated when the tools are used or the treatment to which the tools are subjected. In addition, the use of Permaloy is said to enable diamonds to be reset without being ruined.

"Ind-L-Way" Twist Drill Grinding Fixture

To meet the demand for an adjustable fixture whereby twist drills with angles from 30 to 90 deg. can be accurately



(Above) "Ind-L-Way" Fixture No. 3 for grinding drills from ¼ to 2% inches. (Below) "Ind-L-Way" Fixture No. 1 for drills from A-% to % inch

ground, Industrial Engineering Co., Inc., 141 W. Jackson Blvd., Chicago, Ill., has brought out a precision built twist drill grinding fixture, to be known as the "Ind-L-Way," which is available in types for grinding drills from A-¼ to 2% inches. The Ind-L-Way Fixture No. 3 shown in the upper illustration herewith is designed for grinding drills from % to 2% inches and the Fixture No. 1 shown in the lower illustration, for

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MIDWEST ADJUSTABLE EXTENSION TOOL
HOLDERS in use for PINISH REAMING Operation
on Cylinder Blocks in a Detroit Automotive Plant

Compensate for TOOL WEAR and UNEQUAL TOOL LENGTHS on single and multiple spindle jobs with MIDWEST ADJUSTABLE EXTENSION HOLDERS

 ADJUSTMENTS CAN BE MADE IN STEPS OF .001 OF AN INCH.

- OPERATOR CAN MAKE ADJUSTMENTS BY HAND— NO TOOLS NEEDED.
- SET-UP TIME IS REDUCED.
- DESIGN IS SIMPLE, CONSTRUCTION RUGGED.
 ALIGNMENT ACCURATE.

HERE'S HOW THEY WORK

Midwest holders are provided with an extremely accurate, ground fit between the sleeve and the shaak. A knurled, graduated collar which controls the adjustment is located at the top of the sleeve. A key fixed in the sleeve, with a sliding fit to a keyway in the shaak provide a positive drive.

Micrometer, longitudinal adjustment steps of .001 of an inch are made by turning the collar one space on the bevelled edge, graduated scale. The collar holds firmly at all positions of the scale. There are no screws or locknuts to give trouble and, without tools of any kind, the operator can easily make the adjustment by hand.

MIDWEST TOOL & MFG. CO. . 2366 W. Jefferson . Detroit, Mich.

END MILLS + SLEEVES + COUNTERBORES + DRILLS SPECIAL TOOLS + REAMERS + FORM TOOLS CARBIDE TIPPED TOOLS + ADJUSTABLE HOLDERS

Precision METAL CUTTING TOOLS



grinding drills from A-4 to 4 inch.
The Ind-L-Way Twist Drill Grinding

Fixture is available with brackets for attachment to Black & Decker and Van Dorn bench or pedestal grinders. Special brackets for adapting the fixture to other makes of grinders can be made from diagrams available from the company.

"Sinszine' for Glass Drilling

Individuals having to perform accurate, sensitive, and rapid drilling operations in glass are said to find especially useful a material known as "Sinszine" now being marketed by E. Karelsen, Inc., 56 W. 45th St., New York 19, N. Y.
Sinszine is said to possess properties that provide for rapid, smooth cutting,

proper lubrication and cooling of drilling tool, long tool life, and the elimination of smears or greasy deposits. According to the manufacturer, the material can be quickly and easily wiped off any glass surface by means of a cloth, leaving a brilliant luster.

Sinszine is supplied in 4-oz, containers with applicator, also in pints, quarts, and gallons.

Century Form J General Purpose Protected Motor

Designated as Form J, a general pur-pose open rated motor of a new protected design is now being offered in



Century Form J General Purpose Protected Motor

sizes from 1½ to 15 h.p. by the Century Electric Co., 1806 Pine St., St. Louis 3, Mo. The upper half of the end bracket is closed to minimize the possibility of dripping liquids or falling solids entering the vital parts of the motor.

Two powerful fans located behind the



BOYAR-SCHULTZ Model B SCREW MACHINE TOOL!

Rigid Construction Generous Chip Clearance Designed for Heavy Cuts With Sustained Accuracy

A sturdy Screw Machine Tool for long runs where close tolerances are desired. Swivelling tool bit and separately adjustable rollers make delicate adjustments possible.

A shoulder is provided on one roller block for use with a straight-edge to quickly locate the center line. This speeds the setting of the tool bit after regrinding.

BOYAR-SCHULTZ CORPORATION

2120 WALNUT STREET CHICAGO 12, ILLINOIS

FOR FASTER RADIAL DRILLING AND TAPPING



The Hammond Radial Drill performs both drilling and tapping operations at high speed. The unique hinged arm construction reduces to a minimum the time required to move from hole to hole. All operating controls are most conveniently located.

Write or wire for price and delivery information.

THE FOOTE-BURT COMPANY · Cleveland 8, Ohio

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bearing brackets draw cooling air through the bearing bracket openings, around the bearings, across the windings, and to air passages between the outer surfaces of the magnetic core and the frame, expelling it through openings at the side and bottom of the frame.

Jobe Tension Wrench

To meet the need for a wrench for use in the repeated tightening of nuts, bolts, or tubing fittings at the same torque

GRAY TURRET HEAD METAL CUTTER OR NIBBLER



GRAY, Originator of First Practical Metal Cutter or Nibbler

Most modern Nibbler for Template Cutting, Tool Rooms, Shipbuilding, Air craft Parts, Aircraft Tub-ing, Sheet & Plate Shops.

GRAY MACHINE CO. Box 596, Philadelphia, Pa.

GRANT RIVETERS



e Pioneers in the riveting field. Head rivets from smallest to \%" diameter, either by noiseless spinening or vibrating hammer method.—Sizes to meet all needs.—Types include Vertical and Horizontal Multiple Spindles. Write for literature—and don't forget to send samples.

THE GRANT MPG. & MACHINE CO.

96 Silliman Ave. Bridgeport, Conn



Jobe Tension Wrench

load, Joyce & Associates, 819 Washington Bldg., Los Angeles 13, Cal., has introduced the Jobe Tension Wrench illustrated herewith, which is designed so as to snap open when the proper torque is attained, thereby indicating to the operator to discontinue tightening. When the load is released, the wrench snaps back to neutral.

The Jobe Tension Wrench is provided with a broached head to permit passage over tubing when used in tightening hydraulic, oil, and fuel line fittings. For tightening wing nuts on hose clamps, a special adapter can be used. The wrench is made in various sizes with torque settings as required by the user.

SN-7 Formula for Floors

Designated as SN-7 a powdered product which is said to make greasy, oily, wet, or slippery floors nonskid in a single quick, easy application is now being marketed by Sugar Beet Products Co., Chemical By-Products Division, Saginaw, W. S., Mich. According to the manufacturer, SN-7 turns slippery spots or whole hazardous floor areas into safe places to walk or work, and may be applied by hand or with Model 3318 spreader.

A binder for grease, oil, and liquids, A binder for grease, oil, and inducts, SN-7 can be easily swept up when floors are cleaned and is said to be completely fireproof. A single application is claimed to last from three days to a week.

SEND US YOUR PRINTS FOR Quotations

THREAD GRINDING BROACHING MAGNETIC INSPECTION



LOI

KRW offers VERSATILITY and ADAPTABILITY in HYDRAULIC ARBOR PRESSES

It took War's demands for speed and more speed to demonstrate the unusual versatility and adaptability of the KRW Hydraulic Arbor Press. In many cases, when other equipment was not immediately obtainable, we were called on to adapt our hydraulic arbor presses to save the day productionwise. Illustrated here are some of the results that have been achieved. All of these special presses incorporate the time-proven features of the standard KRW Hydraulic Arbor presses. They are now available ... BUILT TO ORDER ... for 2 to 3 week delivery on all orders carrying a priority of AA-4 or better. If you have a problem that a special design press might solve, call us now. Write for our new bulletin describing KRW Hydraulic Presses in 25, 50, 60 and 75ton capacities. HORIZONTAL OPERATION LONG, NARROW WORK Buy More War Bonds

K. R. WILSON

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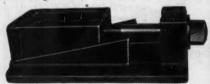
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Accuracy Begins at the Base with Leveling Jacks



Scientifically designed leveling jacks for any equipment which demands extreme accuracy.



Standard Size No. 100A (base 6" x 9", average height 2%", top section 4" x 4%") will fit most requirements.

Extra large base and screw assures permanent accuracy. Angular faces are finished.

SPECIAL SIZES SUPPLIED ON REQUEST.

IMMEDIATE DELIVERY

JURZEK
MACHINE & ENGINEERING CO.
2303 HILTON RD. FERNDALE, MICH.

Pioneer Model MVA Coolant Pump

Designated as the Model MVA, a small size sealless coolant pump which is designed for use with small machines such as hand mills, surface grinders, internal grinders, drill presses, tapping machines, and so on, is now being introduced by the Pioneer Pump & Mfg. Co., 19645 John R St., Detroit 3, Mich. The pump, which



Pioneer Model MVA Coolant Pump

is slightly less than 16 inches in height, is said to have all the characteristics of larger size counterparts developed by the company.

Described as a submerged type pump, the Model MVA is intended for machines having coolant sumps in their bases or for machines provided with separate coolant tanks. In the case of the latter, brackets and flanges are available for mounting pump on the edge, side, or top of tank. According to the manufacturer, chips and dirt that pass through the grille located in the bottom of the pump will readily pass through the pump without injuring it.

DOUGLAS Precision MACHINES





Typical production parts machined on a Douglas Slotter.

Prompt Delivery War Plant

FOR TOOL ROOM AND PRODUCTION

Operation showing set-up for internal grinding.





Operation showing set-up for sharpening straight gash hobs.

DOUGLAS MACHINERY CO., Inc.

150 BROADWAY

NEW YORK, N. Y

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Carruth Sine Plate

A sine plate that is said to facilitate the accurate checking of angular measurements in the inspection of tools and production parts has been placed on the market by Carruth Saies Co., 704 Boulevard Bldg., Detroit, Mich. The unit is designed to measure the included angles on tools or production parts ranging from the extremely small to objects as large as 6 x 10 inches.

large as 6 x 10 inches.

The designed angle between the stationary locating plate and the cylindrical gage bar on the movable block is obtained by building up the angle with

gage blocks. For clamping the work that is being inspected, the block is provided with 54 tapped holes of %-inch diameter.

The movable block is equipped with a



Carruth Sine Plate

guide plate at one end, also a guide plate which can be used on either side, whichever is most convenient as governed by the nature of the tool or production part that is being inspected.

Champion Expanding Mandrels



1/2" to 61/2" Efficient—

Write for circular

THE WESTERN TOOL & MFG. CO.

pringfield e Ohio

JOHNSON'S



Adjustable Limit SNAP GAGES

MODEL A



MODEL B

MODEL

Keep down your gage costs by using these fast, accurate gages. Reset when necessary. Also: Flat and Cylin-

drical Plug Gages, Built-Up and Solid Snap Gages, Flush Pin and many other types of gages.

WRITE FOR DETAILS. Fectory: Pequannock, N. J.

W. E. JOHNSON CO.

Turnpike and Pequannock Pequannock, N. J.

Jomi Torque Wrench

Designed for easy and efficient use by inexperienced mechanics, a torque wrench to be known as the Jomi is announced by Joyce & Associates, 819 Washington Bldg., Los Angeles 13, Cal. The wrench features a micrometer-type adjustment and is calibrated on the barrel in inch-pounds.



DRILL THESE HOLES

BY A QUICK, EASY, INEXPENSIVE METHOD

Your business letterhead will bring literature.

WATTS BROS. TOOL WORKS

Wilmerding, Pa.

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THE NO.73 CROSS Sear Burring Machine

A Universal Burring and Chamfering Machine for spur, helical, spiral bevel and hypoid gears. Both ends of the teeth are finished in one setting and at the same time—Easy to set-up, fast and economical.

Literature upon Request.

OSS GEAR & MACHINE CO

Established in 1898

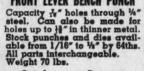
DETROIT, MICHIGAN, U.S.A.



Jomi Torque Wrench

To set, the mechanic merely turns the handle of the wrench until the desired torque is indicated and then locks the setting by a simple partial turn of a knurled locking ring. When the wrench

T. H. LEWTHWAITE MACHINE CO.



Catalogue on Request

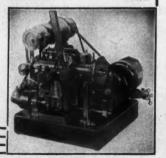
317 EAST 47TH ST. NEW YORK CITY 17

WALTHAM

Pinion and Gear Cutting Machines

with revolving cutter will make 2 or 3 successive cuts for watch pinions or may be used for fine pitch gears up to 1½" dia. Revolving cutter makes successive cuts on blanks held and indexed by work spindle and usually supported by a tail center. Only straight teeth can be cut. Write for Bulletin No. 112.

WALTHAM MACHINE WORKS



is in use, the handle snaps the instant the required torque is attained, thus giving the operator definite proof that the part is properly tightened.

Light in weight, the Jomi Torque Wrench has a small head to permit easy access to confined working areas, and may be used with standard sockets or crow's-feet for tightening nuts and bolts or tubing fittings. The wrench is available in several torque ranges extending overall from 10 to 2,000 inch-pounds.

Whitney-Jensen No. 162 Ball Bearing Double Cut Angle Iron Shear

Whitney Metal Tool Co., 110 Forbes St., Rockford, Ill., announces the addition of a ball bearing double cut angle



Whitney-Jensen No. 162 Ball Bearing Double Cut Angle Iron Shear

iron shear, designated as the No. 162, to its line of Whitney-Jensen products. Easy to operate, the unit has a maximum capacity for 3 x 3 x ½-inch angle

VALUABLE FLOOR SPACE SAVED

Equip your shop with Yohe Storage Racks — Save floor space — Prevent damage to stock—Speed up handling. Yohe Storage Racks are cast of highgrade machinery iron and can be furnished in capacities of 10,000 and 12,000 pounds for storing bars 20 feet long.

Send for illustrated folder.

WM. S. YOHE SUPPLY CO. 505 Gibbs Ave. N. E., Canton, O.

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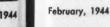
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COODIAI BROACH COMPANY DETROIT 13, U.S.A. Broaches Groaching Machines - Broaching Equipment





The Almond Three Jaw Drill Chucks were the first to be placed on the market. They were Pioneers in the field of Drill Chucks!

ALMOND THREE JAW DRILL CHUCKS

are furnished in 9 sizes with capacities from 3/16" to 1". These are made in heavy and light duty types with a taper arbor hole or with a threaded arbor hole.

Write for Complete Details

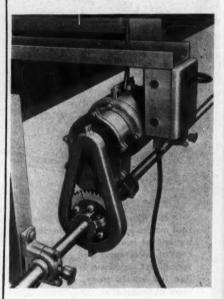


iron which, it is claimed, can be cut by a single worker without any distortion of either leg of the angle iron.

The Whitney-Jensen No. 162 Ball Bearing Double Cut Angle Iron Shear has an overall height of 21 inches, overall width of 12 inches, and net weight of 135 lbs.

Northern "Travelator"

Known as the "Travelator" a device for motorizing hand traveled crane bridges up to 10 tons capacity without



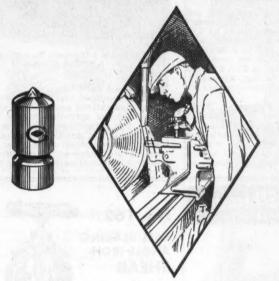
Northern "Travelator"

the need for structural changes is now being manufactured by Northern Engineering Works, 2615 Atwater St., Detroit 7, Michigan.

As shown in the accompanying illustration, the Travelator is mounted on a channel iron in such a way that it drives the squaring shaft through a split sprocket. The split sprocket is mounted on a split clamp so that the assembly can be installed without removing the squaring shaft. The only part of the crane that need be removed is the hand pull chain.

The Travelator is controlled through a pendant cord push button that may be arranged to follow the trolley so that EXPERIENCED OPERATORS FOR MANY YEARS
HAVE PREFERRED

GILMORE DIAMOND TOOLS





From Needlepointed Diamonds for delicate shaping of thread grinding wheels, up to husky diamonds that can take care of heavy centerless-grinder wheels, these tools stand the test for economy and satisfaction.

Circulars on request.

F. F. GILMORE & CO.

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Boston (16), Mass.

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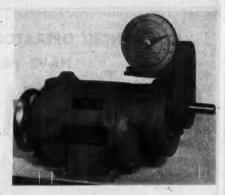
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the button is always near the load and the operator. The Travelator may be mounted at any position on the squaring shaft, however, it is usually mount-ed near the end. The motor may be placed at any angle since it is mounted in a steel band which may be adjusted to any position.

Globe No. 1 Universal Back-Geared A.C. Coil Winder

Addition of a back-geared a.c. coil winder to its line of No. 1 universal coil winding equipment is announced by The Globe Tool & Engineering Co., 425 Davis Ave., Dayton, Ohio. The unit may be used in winding wire in sizes from No. 16 to No. 42 into coils up to 5 or 6 inches in diameter and 4 inches long. An easilyread counter indicates the number of turns accumulated.

The Globe No. 1 Universal Back-Geared A.C. Coil Winder is available in either a bench model, as illustrated, or pedestal model, and in any back-gear ratio from 2 to 1 to 18 to 1. The winding torque increases with the ratio of the back gear, while the top speed decreases



Globe No. 1 Universal Back-Geared A.C. Coil Winder

by the same ratio.

A floor-mounted foot pedal (not shown in the illustration) provides for complete control of the operation of the winder. Slight foot pressure releases a brake, thus freeing the spindle of the unit. Further pressure closes a mercury switch, starting the motor at an extremely low speed of approximately 10 r.p.m.



Length of blade 5". Weight 45 lbs. Will slit sheets and cut off flats.



The Whitney - Jensen Double Cut Angle Iron Shear is powerful—easy to operate and will cut off all sizes of angle iron thru 3" x 3" x 1/4" without any distortion. Weight 135 lbs. Height 21", width 12".

Write for circular.

WHITNEY METAL TOOL COMPANY

Feb

Safer! Easier to Operate!



Sturdy, single-frame construction that both lifts and carries the load. Built for heavy duty, LYON Lift Trucks oper-ate with a minimum of effort because they're hydraulic. Elevating fast or slow, as you wish — lowering always under safe, positive control by the fingertip release . . . no ratchets, no slip.

Hudraulic Pallet-Type Trucks

They get in and out of cramped quarters easily. Ample elevation to clear uneven spots on runways. Booster rollers facilitate easy entrance into pallets. Can be furnished to fit almost any size pallet.



LYON-Raymond Corporation

310 Madison St.

Greene, N. Y.



No. 4 Motor Driven MILLING MACHINE Mounted on Cabinet Column

Burke motor driven milling machines Nos. 1, 2, 3, and 4 are specially suited for handling small, difficult work on a production basis.

Write for complete information.

BURKE MACHINE TOOL CO.

297 E. 16th St.

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creased pedal depression will increase the speed to a maximum (at full pedal depression) of approximately 2,000 r.p.m. in the 2 to 1 back gear unit.

Boyar-Schultz Model G Universal Tool Bit Grinding Fixture

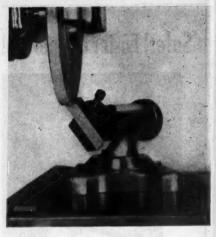
Development of a universal grinding fixture for use in grinding screw machine tool bits, to be known as the Model G, is announced by the Boyar-



Write for details

357 CANALST. . NEW YORK 13, N. Y.

DORMAN MACHINE TOOL



Boyar-Schultz Model G Universal Tool Bit Grinding Fixture

Schultz Corp., 2120-M Walnut St., Chicago 12, Illinois.

When installed on a surface grinder, the fixture is said to enable inexperienced operators to quickly produce uniformly ground tool bits for both right and left-hand screw machine tools. Chip breaker angles to suit any type of material or condition can be ground with the aid of the fixture. The design allows for setting of fixture to proper position for performing accurate repeat grinding operations.

Kennametal F-76 File

Kennametal, Inc., 300 Lloyd Ave., Latrobe, Pa., is now marketing a file made of the same hard, high strength ce-



ADJUSTABLE SNAP GAGES IN STOCK Model A

mmediate delivery .025" to 7"

PROMPT DELIVERY ON PLUG GAGES .030" to 8"

Extraordinary Improvement in Adjustable Snap Gages with Ball-tipped anvil and amazing positive locking system cannot get out of set—Pat. Appl'd for.

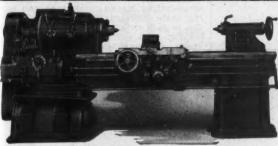
GOOD Prevent Spoilage GAGES Speed-Up Operations Utilize Less Skilled Help Reduce Costs

EASTERN PRECISION GAGE CO.

HERSH TOWER BLDG., BROAD ST. ELIZABETH, N. J. Phone, Elizabeth 2-9519



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TOLEDO. Frank D. Lake Co. Canadian Representative: Moore Bros. Mach'y Co. Ltd., Montreal

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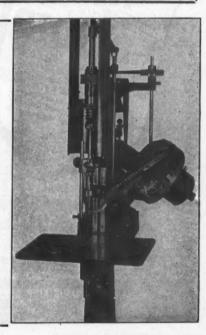
THREE MODELS

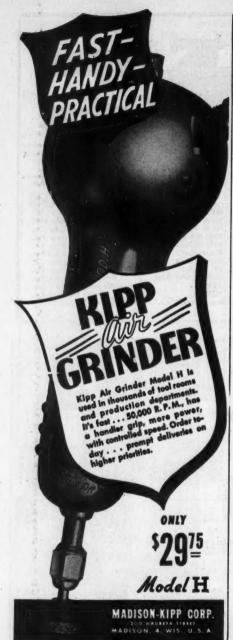
MACHINES WILL DRIVE WOOD. MACHINE AND SELF-TAPPING SCREWS at ONE SECOND EACH

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DETROIT POWER SCREWDRIVER CO.

2807 W. Fort St. DETROIT 16, MICH.





mented carbide compositions used in steel-cutting Kennametal lathe and boring tools. Designated as the F-76, the file is said to allow for the use of unusually high surface speeds and to cut steels of a hardness up to 62 Rockwell C. On cast iron and brass, the file cuts at surface speeds around 900 feet per minute, the manufacturer claims. High carbon, high chromium steels can be filed at 800 s.f.m., it is stated, with the



daad

Kennametal F-76 File

file remaining in good condition after weeks of use.

The Kennametal F-76 File is 11 inches long x % inch wide x % inch thick and has a substantial filing surface 4 inches long which consists of grade K4H Kennametal (80.6 Rockwell C), single cut with teeth at 30-deg. shear angle, 40 per inch.

Whitney-Jensen No. 38 Throatless Bench Shear

The Whitney-Jensen No. 38 Throatless Bench Shear shown herewith, product of the Whitney Metal Tool Co., 110 Forbes St., Rockford, Ill., has a maximum capacity for A-inch mild steel. Ruggedly

300

MEAD Presents the

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The new Mead Air Press delivers 400 lbs. pressure on 100 lbs., line pressure. Handles many staking, crimping, assembly, and similar operations. Stroke of ram adjustable from 0" to 2". Maximum clearance 4". With foot control this press will speed up countless bench jobs, save muscular effort. Write for new AIR POWER Catalog—just off the press.



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"Hallowell" Work-Benches of Steel are exceptionally sturdy Steel are exceptionally sturdy and stand up even under to-day's industrial stress without signs of weakening. Logs are strongly ribbed for rigidity, and being reinforced by flanged steel stringers require no castly botting to the floor. Benches are available in over 1300 ready-made interchangeable combinations — verying heights, lengths, widths.

for use where steel is war-restricted, we are now making "HALLOWELL" Duration Type Work-Benches of Wood.

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JENKINTOWN, PENNA., BOX 556 BRANCHES: BOSTON. DETROIT. INDIANAPOLIS. CHICAGO. ST. LOUIS. SAN FRANCISCO

constructed and easily operated, the unit is equipped with a 5-inch long blade and can be used to slit sheets and cut off flats.

8% inches high overall, 7½ inches wide overall, and weighs 45 pounds net.



Whitney-Jensen No. 38 Throatless Bench Shear

The Whitney-Jensen No. 38 Throatless Bench Shear is 11 inches long overall,

"Kerk-Aloy" Overlay Metal

An overlay metal which is said to possess such unusual qualities and characteristics that worn metal faces, edges, and surfaces to which it is applied regain their original efficiency is now being offered by the Kerk-Aloy Co., Bloomington, Ind. The metal, which is known as "Kerk-Aloy," is claimed to be exceptionally easy to apply and to bond homogeneously with any metal except lead and aluminum.

Due to its high resistance to wear, Kerk-Aloy is said to be ideal for use on harrow points, steam shovel lips, dredge lips or dippers, and other equipment subject to long, hard service. It can also be efficiently used in reclaiming tappets, rocker arms, push rods, wrist pins, and other automotive parts, tools and equipment.

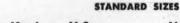
Kerk-Aloy can be applied with an acetylene torch or electric arc, does not require the use of bonding fluxes, and is said to flow evenly without the characteristic of gasification.

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Four sizes. All Welded. Olive Green enamel.

BENCH TOPS

Steel and wood with or without drawers.

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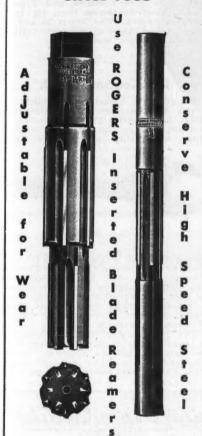
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Wetmore Inserted-Blade Reamer

Wetmore Inserted-Blade Reamers

A line of reamers of adjustable, in-serted-blade design is announced by the Wetmore Reamer Co., 418 N. 27th St., Milwaukee 8, Wis. The reamers are

available with high speed steel. cast alloy, or tungsten carbidetipped inserted blades having left and right-hand cutting angles.

The Wetmore inserted-blade reamer line comprises a Type

36 reamer which is available in sizes and styles for holes from % to 31/32 inch; Type 11 reamer for holes from 1 to 3 inches, and Type 7 shell reamer for holes from 114 to 6 inches inclusive. The Types 36 and 11 reamers can be obtained with either straight or taper shanks.



Nameplate Detail Press

This machine quickly stamps details and serial numbers into name plates.

Write for Particulars

GEO. T. SCHMIDT, Inc.

1806 Belle Plaine Ave., Chicago 13, III.

Ioar Conduit Wrench

According to announcement made by Joyce & Associates, 819 Washington Bldg., Los Angeles 13, Cal., knurled or serrated fittings for conduit, conduit plugs, and tubing can be quickly and



Joar Conduit Wrench

safely tightened without scarification or distortion by the use of the Joar Conduit Wrench now being marketed by this firm. Self-ratcheting, the wrench may be used with equal facility in clockwise or counterclockwise direction, and is designed to permit easy access to fittings in restricted working quarters.

The Joar Conduit Wrench comprises

a broached jaw to permit passage over the tubing. This jaw encircles the fit-ting and with a slight jack-knifing ac-tion, a shoe slides forward to engage the



SPUR, BEVEL, WORM, HELICAL, INTERNAL, IN ALL MATERIALS.

No stocks. Send B/P for quotations. Speed Reducers: Over 75 types and sizes.

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Safety, Economy, Speed **PLUS Better Welding!**

A weldment can be no stronger than its weakest weld—and "down-hand" welding is your best assurance of strong flawless welds. That's why "positioned welded" is so frequently specified today!

C-F Positioners eliminate crews with slings and chains, clear your floor space, reduce accidents and make every weld a faster, better weld! The 135° beyond horizontal tilting feature of C-F Positioners combined with 360° table turn assures the proper welding position in even the most inaccessible corners

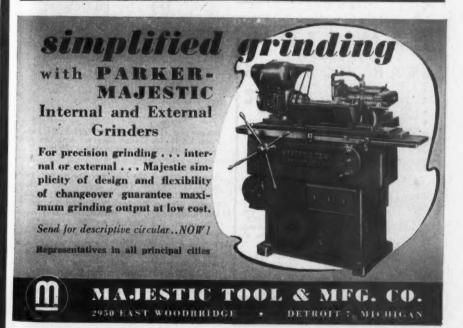
Adaptable tool Heat treating, cutting, large pipe and boiler-handling problems and jobs where a continuous turn is necessary, are easily answered with a C-F Positioner. You'll find new uses! Many sizes and true-rated capa-cities. Hand or power operated. Write for catalog showing sizes, installations and many uses.



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1311 S. Kilbourn Ave. Chicago 23, U. S. A.



ARMSTRONG-BRAY

Gear and Wheel PULLERS



STEELGRIP Standard Rigid Arm Gear and Wheel Pullers are of improved design. Will not slip from work. Arms are forged and heat-treated. 2-arm, 3arm and special models. 12 types and sizes. CHAINGRIP Universal Pullers pull wheels, solid gears, pinions, etc., even at considerable distance from end of shaft. Prooftested chains have both chain hooks and special pulley hooks. 3-ton and 12-ton capacities.

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ARMSTRONG-BRAY & CO. "The Belt Lacing People" 5346 Northwest Hghy., Chicage 30, III.

fitting snugly against the jaw, thus providing a firm nonslip grip on the fitting.

The Joar Conduit Wrench is available
in various sizes to cover all standard

fittings now in use on aircraft.

Martin Adjustable Punch Press **Enclosure Guard**

Designed to prevent accidents to punch press operators by providing an effective enclosure which keeps the operator's

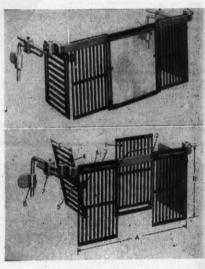


Illustration showing Martin Adjustable Punch Press Enclosure Guard together with the vari-ous adjustments which it offers

hands out of the danger zone yet permits holding or feeding the work close up to the die, the Martin Adjustable Punch Press Enclosure Guard shown in the accompanying illustration has been placed on the market by W. I. Martin & Co., 711 S. Dearborn St., Chicago, Ill.

According to the manufacturer, the guard is applicable to any operation, such as blanking, strip-feeding, punching, notching, and so on, where the operator does not have to place the individual part directly in the die. It can also be applied to hand-fed operations thru the use of a slide feed, dial feed, safety tongs, or similar means for setting the

HAMILTON HOBBERS



... for accuracy and speed in hobbing PINIONS. GEARS and SECTORS.

> TWO MODELS

No. 00 SPUR GEAR HOBBER for work up to 2" dia. No. 1 SPUR SPIRAL GEAR HOR BER (Illustrated) for work up to 6' dia.

> Write for further details to

TRIPLEX MACHINE TOOL CORP. Exclusive Sales Agents 125 Barclay St., New York 7, N. Y.

Manufactured by THE HAMILTON TOOL CO. Hamilton, Ohlo

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INVINCIBLE ANGLE DRILL ATTACHMENTS

Three sizes available from stock. 45° single angle, 90° single angle. 90° double angle.

A special thrust ball in Invincible Angle Tool Attachments takes the wear instead of the gears, giving long service life. . . Invincible tools get into close

corners, tight spots... save time and expense. Check Invincible today on these versatile, highspeed, long-lasting Angle Drill Attachments.

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INVINCIBLE TOOL COMPANY

Angle Tool Attachment Manufacturers

6111 EMPIRE BLDG., PITTSBURGH 22, PA.

Hartford

"SUPERSPACER"

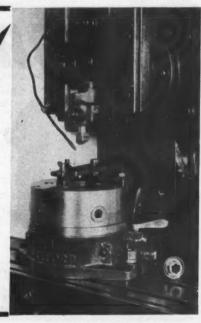
The Hartford "Superspacer" is more rigid and more rapid in operation than the conventional dividing head.

Very accurate multi-splines are being slotted in heat-treated steel as shown in this illustration.

Hartford "Superspacers" can easily be set up for one piece or thousands.

Write for complete specifications and illustrations of milling, drilling, grinding, jig boring, planning, slotting and boring operations.

THE HARTFORD
SPECIAL MACHINERY CO.
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February, 1944

MODERN MACHINE SHOP

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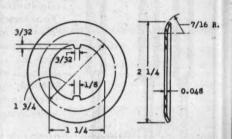
thru fety the part in the die without placing the hand under the ram.

The principal advantage claimed for the new guard construction is the exceptional amount of adjustment provided which enables one guard to be used in connection with a wide variety of dies and operations. The guard is composed of individually adjustable gates of 12 gauge steel, perforated with vertical slots at the front of the guard for easy visibility and with horizontal slots for the side gates to permit feeding the work directly through the gates if desired. The side gates can be raised or lowered or tilted in or out to clear strip stock, and the center front gate can be raised or lowered to allow for feeding or hold-ing of work from the front. The overall width of the guard is readily adjustable to suit different sizes of dies, and the entire guard may be removed as a unit for changing dies by loosening two set screws. A universally adjustable mounting bracket to fit any size of punch press is provided.

The Martin Adjustable Punch Press Enclosure Guard is available with center gate of transparent plastic, as shown, or with slotted steel center gate. Enclosures to meet special guarding requirements can also be obtained on order.

F & H Spring Steel Washer for Grinder Spindle

A spring steel washer for use in firmly tightening grinding wheel to grinder spindle so as to eliminate slippage has



F & H Spring Steel Washer for Grinder Spindle

been developed by F & H Mfg. Co., 10338 Gratiot Ave., Detroit 13, Mich. By simply turning the nut on the end of the grinder spindle tightly down on the washer with a wrench, the grinding wheel is said to be locked firmly in position as a result of the spring action of the

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GOOD DELIVERY

Has one H.P. built in motor with variable speed control, using REEVES standard pulley and belt.

Smooth automatic brake acts instantly when switch is thrown.

Collets or chuck may be used.

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For Quick — Accurate Set super PALMGREN Heavy Duty Angle Vises are built sturdy and rugged for tough, heavy jobs. They are accurately graduated in degrees, can be quickly adjusted to any angle, stay locked under severe service and save valuable hours otherwise wasted in tedious make-ready, wedging or making temporary jigs and fixtures. Java robe hardened and ground. Special outstanding isabures are the size and opening of java -6 laws open full 6 to, with corresponding depth of Java was hardened and count, with corresponding depth of Java was open full 6 to, with corresponding depth of Java was open full 6 to 7 days open full 6 to 10
CHICAGO TOOL & ENGINEERING CO.

PRECISION WORK AT ANY ANGLE



Anchine uses No. 5-C Rivett Callet — a popular size which many plents now have. Has single lever central—starts-stops-applies brake, opens and closes collet. Has 4-step V-Bolt Drive-Throaded nose spindle for use of 4" 3-jew universal chuck-

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wouldn't be without them.

Immediate Shipment on all sizes against rated orders. 48 hour Reconditioning Service for your broken and damaged tap extractors.

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The **WALTON** Company 94 ALLYN STREET - HARTFORD, CONN.

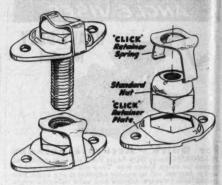
washer. The F & H Spring Steel washer is standardly available in 2½-inch diameter x 1½-inch hole sizes but it can, however, be made to any particular size desired.

"Click" Nut and Bolt Retainer

Of particular interest to design and production men, "Click," a new type of nut and boit retainer produced by Kaynar Mfg. Co., Los Angeles, Cal., is adaptable to any aircraft, marine, or ordnance nut or bolt and is interchangeable with present types of anchor fittings except where slightly greater width would cause interference. Approved by the U. S. Army Air Corps and C. A. A., the design of the unit comprises a retainer plate and retainer spring, both of which are made of cadmium-plated tempered spring steel.

Incorporating the features of standard anchor nuts, Click also provides a nut anchor that can be spot welded to the assembly without affecting its service-ability, as well as a bolt anchor using standard AN bolts. It also allows the conversion of mut plates to blind studs without tooling change while the part is

in production. Click stud retainers can be riveted or spot welded early in production and bolts inserted and locked



"Click" Nut and Bolt Retainer

in place with retainer springs any time later.

The easy removability of the retainer eliminates the problem of stripped nut removal and allows the use of dural nuts in certain applications. Attaching

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SLOW SPEED gear motors, .08 to 1140 r.p.m., in 47 sizes from 1/50 to 10 H.P., are described and priced in this 100 page catalog, in such a simplified manner that any one can easily select the correct machine for almost any application.

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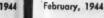
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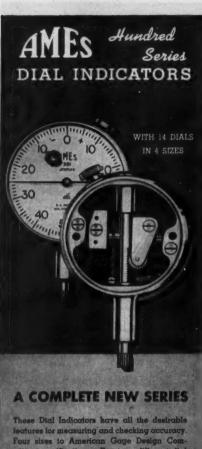
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THE DESMOND-STEPHAN MFG. CO.



These Did Indicators have all the destrable features for measuring and checking accuracy. Four sizes to American Gage Design Committee specifications. Fourteen different did numberings. One-piece, drop-forged cases and stems. Wire attached besels. Cup-shaped did is that need no springs beneath. Pinions and staffs of hardened steel, ground for accurate fitting and long wear. Various styles of backs and contact points. The best and most effective shock-absorbing wheel assembly, optional.

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B. C. AMES CO.

dimensions are held to 0.002 inch, which eliminates line drilling of assemblies and allows prefabrication of holes, speeding installation and ensuring perfect alignment. Use of Click also provides a practical solution to the problem of hard-to-reach nuts that are required to be positively locked by cotter pins.

Armor Collet Chuck

Aircraft Machinery Corp., Burbank, Cal., announces the addition of a collet chuck for small production lathes to its



Armor Collet Chuck

line of. Armor products. A feature of the chuck is a wedge-lock which is said to prevent slippage whether the chuck is used in holding soft aluminum or hard alloy steel and which allows for the use of the chuck with material several thousandths oversize or undersize.

In use, stock is forced against stop and firmly held there by a combination draw-back and push-out action. No heat is generated or power consumed by the Armor Collet Chuck since it revolves with the spindle and requires no bearings or lubrication. The chuck has a

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STANDARDIZED

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Standardized Die Sets, embodying many exclusive features, a listing of more than 195,000 stock sizes and 46 different styles afford a service that is unsurpassed.

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SAFETY (Reg. Trade Mark)
LETTERS and FIGURES

Deeper, clear impressions. Will not spall, will not mushroom. Any size character from 1/32" up.

SAFETY STEEL STAMPS

TOUGH TAPS FOR TOUGH CRANKSHAFTS

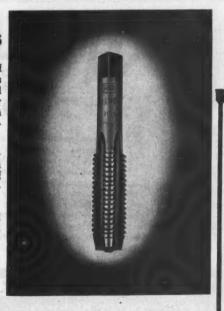
Airplane Crankshafts are made of one of the toughest steels that has ever been devised. They are hard on Machine Tools. The ordinary variety of Drill or Tap is useless on them. Bearing surfaces must be finished to within .000003" of perfect.

Tapped holes must be held to a tolerance of five ten-thousandths of an inch. An imperfection in any one of these operations and a \$600 Crankshaft is scrapped.

Reiff & Nestor Precision Ground Thread Taps are used by several leading Airplane Crankshaft manufacturers.

REIFF and NESTOR CO.

LYKENS, PENNA.



February, 1944

MODERN MACHINE SHOP

313

capacity for round, square, or hexagon type Armor collets. It can also be furnished with adapters to accommodate other makes of collets.

Diamond R File

A metal bonded diamond file or hone with 100 concentration for use in dressing short angles or small radii on abra-



Diamond R File

sive wheels, removing high spots on dies after hardening, honing lathe tools and removing chip build-up while in the machine, and so on, is now being offered by Diamond R Agencies, Pasadena 17, Cal. The small size of the tool (6 x ½ x ½ inch) allows for its use in filing hard-to-get-at surfaces. For exceptionally close work, the file (except for the diamond impregnated surface) may be machined to the desired size.

The diamond grit of the Diamond R

File is impregnated in metal to a depth of 0.010 inch over an area of 1½ x ½ inch, thus providing for long service life together with fast cutting action. The file is available in three grades of diamond grit—coarse (240), medium (420), and fine (400)—and may be resharpened with the same type dresser stick used on metal bonded diamond wheels.

"Hydromite" Cutting Lubricant

A cutting lubricant which is designed to provide for longer tool life and allow for the use of higher operating speeds in milling, threading, drilling, hobbing, reaming, broaching, tapping, and so on, to be known as "Hydromite," is announced by the Filmite Oil Corp., Station K, Milwaukee, Wisconsin.

Described as a true water solution

Described as a true water solution with extreme oiliness, high film strength, and anti-welding properties, Hydromite is said to dissipate heat unusually fast, thus allowing for greater cutting speeds to increase production. Its low viscosity enables it to penetrate to the point of work quickly to lubricate and cool.

Hydromite is supplied in concentrated form, the correct solution for the indi-



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Gear Specialties

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SPURS - HELICALS (14 to 96 D.P.)

BEVELS - (straight and spiral)

WORM GEARING - THREAD GRINDING

This range logically embraces the gear components of many critical control devices essential to the war effort and this organization is proud of its contributions of such material in the program.

With full production capacity scheduled for into the future, all new inquiries are now necessarily subordinated to these vitally important prior commitments. However, every urgent need will be given careful consideration.

Gear Specialties



e Three grades of diamonds. Common quality \$12 per karat. Medium quality \$24 per karat. Select quality \$48 per karat. (Contour template diamonds supplied only in Medium and Select quality.)
All diamond sizes ½ to 10 karat are nib mounted for immediate shipment. Billed subject to approval. Specily quality of diamond wanted. We recommend a minimum size of one karat for each of diameter of grinding wheel. (24 hour resetting service, \$1.00 post paid.)
Write for Cetalog showing Most Complete Line of Diamond Tools for War Production Distributed thru Mill Supply Jobbers

DIAMOND TOOL COMPANY, Not Inc. Sheldon M. Booth, Press 938 E. 41st Street CHICAGO, ILL.



NEED SPROCKETS NOW?

There are over 50,000 CULLMAN Sprockets in stock ready for IMMEDI-ATE delivery.

If none of the stock sprockets meet your specifications, you can get CULLMAN Sprockets MADE TO ORDER promptly and economically. CULLMAN specialized equipment and experience are your assurance of this.

Write for catalog and essential information for sprocket users.

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MORTON Enlarged view of perforated raised button with sharp gripping edges.

It's a "MUST"!

The die formed, perforated, upset buttons that "grip men's soles", prevent slipping because they do not wear smooth and will not retain oil, water or other liquids. Morton Steel Safety Tread Ramps are furnished in flat pieces or with turned down edges for all types of supporting structures. Ramp plates, portable or stationary, are also used to bridge pits, holes, etc.

HEAVY MACHINERY MANUFAC-TURERS—Use Morton Safety Treads for ladders, stairs, platforms, and catwalks on the equipment you build.

Free Sample—to machine shop executives or supervisors.

MORTON MFG. CO., 5119 W. Lake St., Chicago, III.



vidual job being obtained by merely adding water. Transparent and practically colorless, the lubricant, according to the manufacturer, has no strong objectionable odor and does not smoke in use. Being a water solution, it is easily removed from the finished work and drains well from chips.

McGill No. 3007 Vaporproof Safety Guard

Said to eliminate the danger connected with handling electric lights in wet

places, a vaporproof safety light bulb guard designated as the No. 3007 is announced by the McGill Mfg. Co., Inc., Valpa-raiso, Ind. Constructed of nonmetallic materials so as to make it shockproof and nonsparking, the guard is light in weight, buoyant, and will even float when placed in water.

According to the manufacturer, the splashing of liquids cannot cause breakage of . the light bulb, since the bulb is covered by a heat and impact-resisting airtight globe which is protected by a strong fiber cage. The cage itself is treated to prevent warpage and the whole is firmly attached to an unbreakable plastic handle that is fitted with a rubber

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McGill No. 3007 Vaporproof Safety Guard

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bushing which when squeezed in place by the screw-nut at bottom seals the inside airtight and keeps the wire in place.

keeps the wire in place.

The portable feature of the McGill No. 3007 Vaporproof Safety Guard enables light to be taken where it is needed, even in hard-to-get-at places. The guard, which is provided with a strong fiber swivel hook for conveniently hanging, is recommended for use in shipyards, painting booths, around grinding and

Coated Abrasive Belts and Discs
IN STOCK FOR
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These Popular Sizes Available in All Grains

В	ELTS	DISCS
1×42"	6x48"	12"
4x36 1/4	6x48-5/16 6x541/2	14
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Other sizes available for 2 - week delivery from receipt of order including waterproof type belts.

Complete Stock rolls, sheets, fibre combination discs.

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The FELL Precision Level is made to show the level of all ways at once. This eliminates disturbing the first level when leveling the second. Graduations are in .0005" per foot and form squares about a circular bubble, thus giving co-ordinate readings and showing direction and amount of slope, if any.

MADE IN TWO SIZES
51/2" x 12" 31/2" x 6"
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W-S Standard Reamers with carbide tigs.
Tapered shank (illustrated) and straight shank types. Sizes: 1/4 to 11/4.

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REAMERS and many other cutting tools, formerly in the "special" class are now STANDARD with us. The majority of these STANDARD cutters is in stock most of the time. Our broad line often enables the consolidation of tool orders and saving of valuable time. Each W-S tool is tipped with the correct grade of carbide best suited to do a cutting job on the metals for which the tool was ordered. Carbide tipped tools are not just a specialty with us... we make them exclusively. You can expect and get uniform, high quality results with W-S tools. Write for new PREE Catalog 144 and latest prices. WENDT-SONIS COMPANY, HANNIBAL, MO. Branch Warehouse: Long Beach, Calif.

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Sizes: ½ to 1½.

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Tipped Centers
vailable in Morse,
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CARBIDE TIPPED CUTTING TOOLS
CENTERS - DRILLS - COUNTER-BORES - SPOT FACERS - END MILLS - REAMERS
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cutting machines using coolants, at airports, and so on.

American Self-Sealing Coupling

Available with AAF or AN threads, a self-sealing coupling which is said to withstand a pressure of 2,500 lb. per



American Self-Sealing Coupling

square inch after just ordinary finger tightening has been developed by American Screw Products, 7000 Avalon Blvd., Los Angeles 3, Cal. According to the manufacturer, tests under severe handling conditions show that the heavy construction of the aluminum alloy body prevents distortion as well as the possibility of jamming the spring-loaded shut-

off valve.

Springs are made of heat-treated steel. Poppets are cast of lightweight phenol and are said to be positive scaling in action. A synthetic gasket provides for leakproof connection when coupling is installed.

"Basa" Plastic Face Hammers and "Empire" Plastic Mallets

Greene, Tweed & Co., 4377 Bronx Blvd., New York 66, N. Y., announces that its "Basa" replaceable face hammers and "Empire" mallets are now available with plastic faces and heads respectively as well as with rawhide faces and heads. The plastic used has been selected for qualities that make it specially adapted to the purpose of hammering, the plastic, according to the manufacturer, being particularly tough and resilient, unusually resistant to chipping, splitting, or mushrooming, and eliminating the possibility of marring the surface struck.

The dimensions and weights of the Basa Plastic Face Hammers and Empire Plastic Mallets are the same asthose of the rawhide tools, and the new



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GRAHAM MULTI-PURPOSE VISE

See for yourself the many applications of this unusual vise that is also a many-purpose ig or fixture. Fits a variety of machines: drill press, radial, planer, shaper, miller, grinder. Holds many types of work in many positions, with sufficient accuracy for average repeat-operation work.

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D&W MAGNETIC CHUCKS



Standardize on D & W Chucks. It is designed to give maximum holding surface with strong and uniform pull. Special demagnetizing switch supplied with each chuck, for readily releasing work.

Send for folder covering chucks and demagnetizers

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Wizard Electric Counters count anything that will operate a switch, relay or photo-electric cell. They are being operated by the sound of falling parts. May be located at any distance from the source of count.

Every part is designed for electrical operation and heavy duty industrial service.

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Production Instrument Company
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Manufacturers of Counting, Timing and Recording Devices

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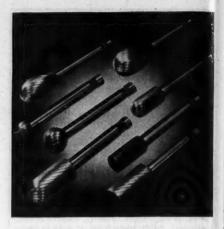
ly designed tools are said to be readily applicable to the same uses as the raw-hide hammers and mallets. According to the manufacturer, each tool is pro-vided with ideal gripping surface and is perfectly balanced to minimize fatigue. In addition, the special plastic employed is said to prevent transmission of impact shock to worker.

The plastic hammers have the distinctive Basa features of adjustable heads and speedy replacement of faces by means of movable jaws and lock nuts.

Carbur Cemented-Carbide Rotary Files

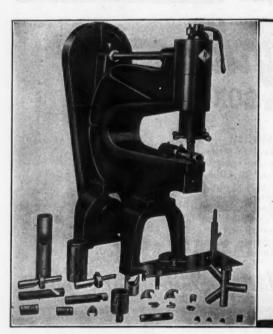
Carbur, Incorporated, Lincoln Park 25, Mich., announces the addition of six new tools to its standard line of cemented-carbide rotary files. These tools are available in three shapes, each of which is furnished in two sizes. The accompanying illustration shows the new shaped tools together with the two ball end type files originally introduced to the trade.

All tools have cutting teeth ground from the solid which are said to re-



Carbur Cemented-Carbide Rotary Files

main sharp over long periods of use, a feature which, together with the fact that the tools can be operated at unusually high speeds, allows for the performance of efficient burring operations in a minimum of time.



For FAST and SAFE cutting of sheet metal, duplicating parts, and to relieve other machine tools, investigate the

SAVAGE NIBBLING MACHINE

TUBE SLOTTING AND TUBE SHAPING For cutting flat sheets by template or to a scribed line.

Cutting Capacities

Flat Sheets Mild Steel 3/4"
Tough Alloys 3/8"
Tubing

Wall thickness to 18"
1" I.D. to 36" O.D.

The Fastest Method of Tube Slotting and Shaping by Guide Template.

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KNOXVILLE TENNESSE
Pioneer Manufacturers of Nibbling Machines

Feb



Adjustable to fit various size lathes. (Bushings are turnished with each boring bar.) Everede Holders keep the boring bar in a horizontal position, regardless of any change in the size of the lathe, within limits. • The No. 1 Holder for lathes from 7" swing to 9". • The No. 2 Holder for lathes from 8" swing to 12", and the No. 3 Holder on engine lathes from 12" swing to 24".

EVEREDE TOOL CO.

WILLIS STUTSON
180 N. Wacker Drive Chicago 6, III.



This new, streamlined bench type grinder assures fast, quality finishing on metals, plastics, wood fibre...at low cost. Built to machine tool specifications, Standard D-4 is equipped with improved band tension control and specially designed protective motor hood. 4x361/4" band. The ideal portable unit.

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A RADII & ANGLE DRESSER OF PRECISION AND VERSATILITY



An instrument of precision and versatility... Operation is simple requiring no high degree of skill for accuracy... Any one of the following can be produced with one setting:

One angle
Two angles
Concave radii up to 3º
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Many other diversified forms to meet requirements.

Wheel size capacity—14" dia.; angular travel 3"; for use on universal surface and cylindrical grinders.

Full details available on request.

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February, 1944

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SPECIAL NEW FLOOR RESURFACER

Resists Acid, Water, Oil, Grease

Where floor conditions are such that ordinary concrete won't stand the gaff without plenty of headaches, AWOG is the perfect answer. Scientifically developed for super-resistance against acid, water, oil and grease, this new material sets up a smooth, case-hardened surface which is dusting less and durable under the most punishing traffic conditions.

ENDS MACHINE SHOP FLOOR PROBLEMS

Besides being impervious to the disintegrators commonly found on machine shop floors, AWOG withstands grueling loads, steel wheels, hard knocks. Sanitary and easily cleaned because its close knit, non-porous surface cannot harbor germs, filth, or waste matter. AWOG is recommended for new floors; for over-lays over brick, stone, or wood: for repairing or resur-

wood; for repairing or resurfacing areas of any size indoors or out.

Write for further **Information and Details**

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Pleas	 end :	me	comp	lete	AWOG	information .	
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EDUCATIONAL FILMS

Stainless Steel Film

An interesting 16 mm, motion picture film entitled "Stainless Steel" has been released by the Bureau of Mines. Produced in cooperation with the Allegheny Ludlum Steel Corporation, this unique film graphically traces the intricate process followed in the production of Allegheny Metal — a corrosion-resistant steel that combats rust.

The theme of the picture is established by depicting a simple experiment contrasting the corrosion resistance of stainless steel with ordinary steel. The un-usual qualities apparent in stainless steel are then explained through a series of interesting scenes which permit a visual tour of the giant Allegheny Lud-lum plant at Brackenridge, Pa.

The audience sees an electric furnace charged with raw materials and the addition of carefully measured amounts of chromium and nickel to produce differ-ent grades and types of Allegheny Metal. A ring-side seat is afforded as the charge begins to melt and bubble and as sample ingots are taken from the molten mass. Next, the process is followed to the soaking pits and thence to the im-mense rolling mills and shears until the finished product is ready for the manufacture of any one of numerous stainless steel items.

The film is admirably suited for use by industrial and civil defense training classes, training classes conducted by the armed forces, and for schools, col-leges, and so on. Applications for free short-term loans of "Stainless Steel" should be addressed to the Graphic Services Section, Bureau of Mines, 4800 Forbes St., Pittsburgh 13, Pennsylvania.

U. S. Office of Education 1944 Series Educational Films

The United States Office of Education is releasing a number of new 1944 sound films for mass training in critical occupations. To assure maximum success in the use of these skill-teaching visual aids, the Office of Education has consulted with the War Manpower Commission to select occupations in war industries which presently require first attention.

Subjects covered by these 16 mm. sound motion pictures include Shipbuilding (Marine Machinery Installation, Coppersmithing, Pipe Fitting); Machine



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with a BEVERLY Throatless SHEAR

If you're cutting straights or irregulars on "War" jobs, you can speed 'em up with a BEVERLY. Write for sizes and prices now!

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The CRITERION Carbide Tool Grinder

GREATER RODUCTION CAPACITY

Provides positive rapid adjustment to meet the rigid requirements of production tool manufacturing. Built for continuous service. Adjustable coolant system. Large work tables instantly adjustable without wrenches or other tools. One-third H.P balanced precision bearing motor completely enclosed and radially mounted in rubber. Standard equipment: One 60 and one 100 grit 7" dig. steel backed milicon carbide wheels. Ideal for metal bonded or Resinoid bonded diamond wheels.

Order from your dealer or write direct. Request literature. No obligation.



ROBERTSON'S ECONOMY SPEED HACK SAWS

The No. 4X Type Robertson ECONOMY Saw is especially suited for heavy, continuous production metal cutting and gives smoother action and faster cutting. Other salient features include—

Bronze brushed journal bearings
 Standard stroke of 6" a Automatic stop a Gravity feed with adjustable pressure blocks a Hydraulic lift on back stroke a Standardized construction a Accessibility to all parts a Few

Robertson ECONOMY Power Hack Saws are in use throughout the world—more than 30,000 have been installed. Make your next power hack saw a Robertson ECONOMY for speed and accuracy.

Robertson builds a complete line of Power Hack Saws in sizes and types to suit your needs. Send for illus-trated folder Form 1-A which gives complete details.

ROBERTSON CHINE & FOUNDRY CO., INC.

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BUFFALO 7,

Shop Work (Operations on the Vertical Milling Machine, Operations on the Engine Lathe, Operations on the Planer, Blueprint Reading); Engineering; Aircraft Work (Templates, Blanking, Forming, Tube Benching). The film on each subject is supplied complete with 35 mm. filmstrip and manual—the filmstrip to emphasize and review key points in learning a job and the manual to suggest ways of using the motion picture and filmstrip.

A complete catalog listing and describing all of the films is to be prepared and will be distributed by Castle Films, Inc., with offices at 30 Rockefeller Plaza, New York 20, N. Y.; Field Bldg., Chicago 3, Ill.; and Russ Bldg., San Fran-

cisco 4, Cal.

Film on Welding Ship Stem Frames

A 16 mm. sound color film on the fabrication of ship stern frames by the Thermit welding process has been produced by the Metal & Thermit Corp., 120 Broadway, New York 5, N. Y. Approximately 900 feet long and requiring

about 25 minutes to run off, the film shows all of the steps in the construction of a stern frame from the time the castings are received at the shipyard until the finished frame is installed in the ship.

The film is available for showing before technical groups and associations interested in shipbuilding and welding.

NEW BOOKS

Fundamentals of Radio. By L. O. Gorder, Kenneth A. Hathaway, and Carl H. Dunlap. Published by American Technical Society, Drexel Ave. at 58th St., Chicago 37, Ill. 373 pages. 228 line drawings and photographs. Cloth binding, board covers. Price, \$2.00.

The fourth of a series of preinduction textbooks prepared in cooperation with the United States Office of Education and the War Department, "Fundamentals of Radio" has been written in a how-to-do-it manner by men who have years of experience and training. The book constitutes a first-level course in the fundamentals of radio, including in-

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MODEL P-30V PUMP For Submerging into Liquid. Either Non-abrasive or Liquids charged with Abrasives. e film e time shipstalled

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PROFILES + DUPLICATES + ENGRAVES
Easily Operated by Women

Engraves: Iron, Soft Steel, Copper, Brass, Aluminum, Plastics Larger Working Area

More Ratios 1:1 to 2:1 by Eighths Variable Spindle Speeds

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VIMCOLIGHT



EYE HAZARDS REDUCEDProduction Increased!

Restful, on-the-spot VIMCOLIGHT promotes workers' accuracy and speed by reducing eye fatigue. This even-glowing, diffused light can easily be adjusted to reach those hard-to-light places. It cancels out the shadow menace. Standard equipment on many leading machine tools. Write for circular.

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because of the ease and speed of setup and changeover. The accuracy is built into the machine itself . . . the direct micrometer setting, for instance, which permits machining to predetermine d depths without pencil figuring ... without errors. Also, the mechanical elimination of backlash.

For the important small jobs . . . die, jig and model making, metal patterns, drilling, milling, reaming, jig boring, etc., the Linley is a profit maker, time saver and a machine that earns its keep in any toolroom. Send for bulletin . . . today.

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formation necessary to the mastery of certain operational skills essential for such Army occupations as communications chief, air forces radio mechanic, air forces radio operator, fixed station radio operator, signal communication instructor, radio technician, radio repairman, signal noncommissioned officer, ground radio repair instructor, field radio communication instructor, and so on.

tion instructor, and so on.

The book is designed to supply men about to enter military service with the basic knowledge necessary for training in any of the above radio jobs. The text itself is devoted to the fundamental principles of radio and the way these principles are applied to radio transmitting and receiving sets. A workbook available with the textbook at an additional cost of 50 cents, contains detailed instruction on how to study this text using a six-step plan and suggests a series of projects to be worked out.

Mathematics has been kept to the substitution of numerical values in the formulas, which are worked out by simple arithmetic. This is done in simplified steps so that the student can easily fol-

Contents of "Fundamentals of Radio" are as follows: Development of Modern Radio; Standard Radio Symbols; Principles of Electricity; Magnetism and Electromagnetism; Resistance; Direct and Alternating Current; Electrical Measuring Instruments; Inductance and Electromotive Force; Condensers and Capacitance; Oscillatory Circuits and Resonance; Vacuum Tubes; Amplifiers and Amplification; Acoustics, the Science of Sound; Microphones; Oscillators; Radiotelegraph Transmitters; Amplitute-Modulated Broadcast Transmitters; Transmitting Antenna Systems; Radio Receivers; Superheterodyne Receivers; Sound-Reproducing Devices; Receiving Antennas; Radio Power Supply; Frequency Modulation; Glossary of Terms; Reference Tables, Formulas, Abbreviations, Etc.; Index.

Industrial Production Illustration. By Randolph Philip Hoelscher, Clifford Harry Springer, and Richard F. Pohle. Published by McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York 18, N. Y. 213 pages, 8½ x 11 inches. 286 illustrations. Price, \$3.50.

This book covers the entire range of pictorial drawing, from both the theoretical and practical points of view, for those who wish to do production illus-

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Means Greater Accuracy In Your Production

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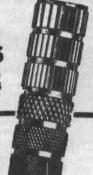
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Recommended for New and Old Machines

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The use of Paddeck Ball Bearing Guides increases the efficiency of the machines so that more and better work can be done. The hazard of operation is reduced. Most of the blade breakage is eliminated. Wheels are interchanged—in effect, three sets of guides in one.

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tration in the aircraft, shipbuilding, ordnance, automotive, or other industrial fields. It shows how to draw views of machines, parts, fittings, assemblies, and so on, from any angle of view, working from mechanical drawings, engineering sketches, and other types of material. The theory of the various projections, construction of pictorial views from them, accurate methods of perspective drawing, and so on, are covered to give the reader a sound basis for work that will meet the most exacting technical requirements.

Axonometric drawing -- isometric, dimetric, and trimetric-has been treated in the conventional manner. In addition, a new method of making axonometrics is presented. Freehand sketching is thoroughly treated and practical suggestions on the shading of drawings are included. Lettering and two and three view orthographic projection are briefly but soundly reviewed. Throughout the text, all procedures are carefully explained and illustrated by breakdown sketches showing step-by-step construction.

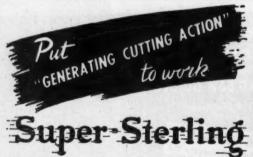
Contents of the book range as follows: Uses of Pictorial Drawing; Lettering; Orthographic Projection; Orthographic Sketching; Axonometric Projections;

Axonometric Sketching: Oblique Projection; Oblique Sketching; Perspective; Engineering Delineation; Shading.

Lubricants and Cutting Oils for Machine Tools. By William G. Forbes. Published by John Wiley & Sons, Inc.. 440 4th Ave., New York, N. Y. 90 pages. Cloth binding, board covers. Price, \$1.50.

The purpose of this book is to explain the fundamental principles of lubrica-tion in relation to metal cutting and the application of various types of cutting oils to machine tool operations. In addition, the principles of machine tool lubrication have been discussed from the viewpoint of practical maintenance.

The first chapter is devoted to a description of standard laboratory tests conducted on new and used oils: the second covers the composition of greases; the third describes the different types of machine tools; the fourth covers machine tool lubrication and maintenance; the fifth discusses the mechanics of metal cutting; the sixth outlines the composition of cutting oils; the seventh covers compounds and blends of cutting oils; the eighth deals with practical ap-



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WITH THIS PATENTED HIGH SPEED STEEL HACK SAW BLADE



Each tooth of the blade is larger in height and pitch. It doesn't "hack"—it cuts with a milling effect. No sticking, binding or chattering. Try it. Order through your Mill Supply Distributor.

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IMPROVED BALANCING WAYS



Four chilled iron discs rotate on special sensitive bearings. For balancing, straightening and trueing. Write for details.

Swing	20"	40"	60"	72"	96"
Greatest Dis- tance Between Standards	20"	30"	30"	66"	88"
Capacity in Ibs.	1,000	2,000	2,000	5,000	10,000

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accurately machined. Securely mounted cast legs are machined and provided with adjusting screws for perfect alignment. Shipping weight, 1300 lbs. Also larger or smaller plates with planed or scraped surface. We also manufacture angles and parallels as shown underneath surface plate.

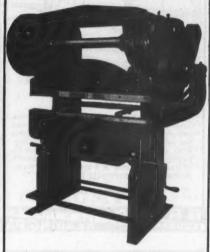
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The BROWN SECTIONAL RACK saves the time wasted end-hauling stock from the old-style, closed-side rack and quickens the selection of sizes by greater visibility. Built of standard metal sections: can be expanded for changes in stock or growth of business. Made in 5 styles: can't burn, depreciation practically nil.

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plication of cutting oils, tool design and machinability tables; and the ninth discusses treatment and prevention of skin diseases that result from contact with lubricants.

Although adapted in part from a more detailed book by the author entitled "Lubrication of Industrial and Marine Machinery," this volume contains practical information for the solution of problems that arise in metal cutting and should prove a useful guide to those interested in machine shop practice.

Slide Rule Simplified. By Charles O. Harris. Published by American Technical Society, Drexel Ave. at 58th St., Chicago 37, Ill. 266 pages. Cloth binding, board covers. Price of book together with slide rule, \$3.50. Price of book alone, \$2.50.

Students, apprentices, and teachers of engineering or apprentice classes will be interested in this book which is being offered in combination with a genuine Dietzgen slide rule. One of the primary aims of the book is to dispel the idea that operation of the slide rule is difficult to master and replace it with the certain knowledge that anyone who will study and practice can learn to use the slide rule with ease and confidence. The instructions are presented in a manner that recognizes the usual difficulties of the learner and overcomes them.

An unusual feature of the book is the complete instruction on how to read the different scales of the slide rule accurately and precisely and thus forestall serious errors. Each type of calculation—multiplication, division, combinations of multiplication and division, the square and square root, the cube and cube root—is discussed so thoroughly that it can be mastered by the reader who studies alone, as well as by those who study in the classroom.



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Precision made (and we do mean "precision") from 3/4" to 4" Hub Diam. to Army, Navy, Air Corps spec. AN-40236 ready to install, or to customer's specifications. Write, wire for Catalog, data, etc.

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Enables even trainees to gage to fraction of .0001" COMTORPLU

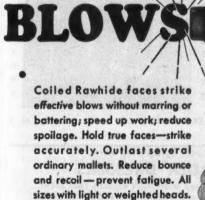
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In airplane, ordnance, automotive and other industries working to ten-thousandths, Comindustries working to ten-industantias, com-torplug solves the problem of how to get machine operators, bench inspectors and inspector-supervisors all "talking the same language." Automatically shows size, front or back taper, out-of-round, bell mouth, barrel shape, etc.

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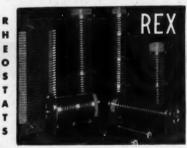
According to the publisher, the treatment of each operation in the first eight chapters of the book is so complete that it can be followed by anyone who has studied arithmetic and can multiply and divide one number by another, even though he has never before seen a slide rule. On the other hand, the material in the final chapters will be of interest to students who have had previous experience with the slide rule. These chapters deal with sines and cosines, the tangent of an angle, and logs and antilogs. At the end of most chapters of the book review problems are given. A brief dis-

cussion of negative numbers and the law of signs is provided at the back of the book for review purposes.

The Dietzgen slide rule offered in combination with the book is of wood faced in white and ruled with the same ruling machine that is used to rule expensive high grade rules. The rule is accurate and dependable in every respect.

SHOP LITERATURE

"Chailenge Precision Equipment for Tool and Machine Industries" is the title of a 16-page catalog, designated as the No. 836, now being issued by The Challenge Machinery Co., Grand Haven, Mich. The catalog features illustrated, descriptive, and tabular information on layout surface plates, clamp edge layout plates, reading tables (for checking propeller blades), checking tables, turn tables, workbenches, bench plates, lapping plates, duplex bench blocks, straight edges, parallel straight edges, round lapping plates, surface plates, surface plate stands, universal right angle irons, angle plates, solid parallels, box parallels, and V-blocks. Copy free upon request.



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4" TRAVEL (counter balanced, hardened, and ground)

6 SPEEDS, 250-3000 RPM, Lever and Worm Foods

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Specially engineered by RUSNOK to meet the demand for heavier duty endmill aperations. Uses a many types of cutters on a wide range of work. Large size spindle (No. 9 B & Staper). Takes 1/6 to 3/7 end mills. Precision Engineered and Ruggedly Constructed Throughout.

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"Grinding Oils and Lubricants for Precision Grinding" is the title of a book published by The White & Bagley Co., Worcester, Mass., which contains a wealth of technical detail on speed and precision in manufacturing made possible through the use of Economy Grinding Oils and Lubricants. The book tells how Economy Grinding Lubricants (the water soluble group) and Economy Grinding Oils are serving on the front lines of industry and why these lubricants are specified for new and difficult problems confronting industry today. Copy free upon request.

"Norbide." The Norton Company,
Worcester 6, Mass., is now issuing a
12-page booklet discussing a patented
material known as "Norbide" (Norton
Boron Carbide) and illustrating and describing its use in the manufacture of
plug, ring, snap, radius, and keyway
gages, gage blocks, inserts, micrometers, indicator points, and so on. Copy
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Vertical High Speed Abrasive Belt Peerless Surfacers



Jefferson Products Catalog. Publication of a new catalog illustrative and descriptive of its line of products is announced by Jefferson Machine Tool Co., 750 W. 4th St., Cincinnati, Ohio. Treated in this eight-page catalog are the company's "Bulldog" precision milling machines with screw and power feed and quick-acting hand lever feed; conversion attachments for lathes (4-tool tool post turret, 5-tool tailstock turret, and adjustable pull feed); endless belt sanding machine; swing frame grinding and polishing machine; gyratory foundry riddle, and milling machine attachments, including plain, tilting, and swivel base dividing heads, plain and swivel vises. Copy free upon request.

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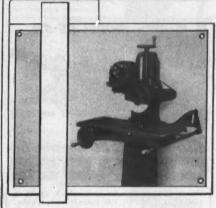
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Cut Set-Up Time
75% through use of the
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3727 Weisser Park Fort Wayne, Indiana

Marvel Metal-Cutting Saws. A 16-page catalog containing information as to features, specifications, and so on, of its line of Marvel metal-cutting machines, including hack and band saw types, has been published by Armstrong-Blum Mfg. Co., 5700 Bloomingdale Ave., Chicago 39, Ill. Also treated are other Marvel products; namely, rod cutters, splitting shears, drill press vises, metal-cutting band saw blades, high-speed-edge hack saw blades, and high-speed-edge hole saws. Copy of Catalog C42 free upon request.



The only hand grinder with spindle speed of 100,000 R.P.M. on 100 pounds air pressure. It has revolutionized hand grinder performance. Can be directed in any working position; operates with extreme ease. Steel construction throughout. Formed to fit the hand. Weighs only 14 ounces.

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Winter Brothers Taps and Dies. A 144-page, plastic-bound handbook and catalog of taps and dies has been prepared by Winter Brothers Co., Wrentham, Mass. The catalog includes illustrated, descriptive, and tabular information regarding carbon steel and high speed steel standard hand taps, three fluted hand taps, chip driver taps (spiral point), standard machine screw taps (spiral point), nut taps, straight shank tapper taps, pulley taps, taper pipe taps, straight pipe taps, and high speed steel standard hand taps (metric sizes), carbon steel serial hand taps, carbon steel standard steps.

shank tapper taps.

Dies covered in like manner include carbon steel adjustable round split dies, adjustable round pipe dies, solid square pipe dies, spring screw threading dies, solid square bolt dies, hexagon rethreading dies, and carbon steel and high speed steel crown dies. In addition, the catalog contains valuable tables and other data on tapped hole sizes and approved threading practice.

Copy of Catalog 19 will be sent free

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Reeves General Catalog of Variable Speed Control Units. Designated as the G-435, a 128-page general catalog containing complete information, including dimensional diagrams and engineering tables, on all Reeves variable speed control units—the transmission, the Vari-Speed motor pulley, and the Motodrive—is now being issued by the Reeves Pulley Co., Columbus, Indiana.

Ivory plastic bound and provided with attractive dark brown cover, embossed in gold, the catalog shows how variable speed control can be applied to all types of production machines to step-up out-

put and improve processing. Complete details are given on recent additions to the Reeves line, including the new reducer-type transmission, which provides speed variations and reduction in one compact unit; the Vari-Speed Jr., which furnishes accurate speed control of light machinery; and the improved differential unit. In addition, the catalog contains latest information on new automatic controls and on the Reeves Speedial handwheel.

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Firthite Color Chart. Offered by the Firth-Sterling Steel Co., McKeesport, Pa., this handy chart illustrates in true form the manner in which the company's eight grades of Firthite sintered-carbide tips are now "color-branded" on the outer ends so that the user can determine at a glance the particular grade of carbide he requires for certain cutting operations. The chart is made of heavy card stock and is provided with a hole at the top for hanging on wall. Copy free upon request.

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This magneto-shaft is typical of careful Ace machining. It is cylindrically-ground on 6 different diameters and 4 separate faces, and both faces and diameters must be ground to a 12-16 micro finish.

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Speedmaster Engineering Manual. 44-page manual for use in the planning of variable speed pulley installations has been prepared by The Speedmaster Co., 1234 Thacker St., Des Plaines, Ill. The manual describes and illustrates the construction and operation of the Speedmaster Pulley, pictures and discusses typical applications of this pulley, and presents dimensional drawings, illustra-tions, descriptive and installation data regarding nine different types of Speed-master Pulleys. Engineering data, maintenance information, specifications, and prices concerning Speedmaster Pulleys round out the contents of the manual, copy of which is available free to executives upon request.





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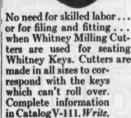
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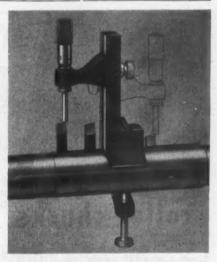
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Holo - Krome Fibro-Forged Socket Screw Products. Designated as the No. 41, a 48-page 8½ x 11-inch catalog featuring data, tables, and specifications concerning Holo-Krome Fibro-Forged Socket Screw Products-cap screws, set sorews, pipe plugs, stripper bolts, and keys—is now being distributed by The Holo-Krome Screw Corp., Hartford 10, Conn. Copy free upon request.

"Near Infra-Red in the Aviation Industry" is the title of an eight-page bulletin prepared by The Fostoria Pressed Steel Corp., Fostoria, Ohio, illustrating and describing the use of near infra-red equipment in performing a variety of baking, drying, dehydrating, and pre-heating operations on aircraft parts, including wings, engine parts, compass parts, walkways, gears, plywood parts, and so on. Copy free upon request.

Hilliard Clutch Bulletins. A series of four four-page illustrated bulletins relating to (1) the Hilliard Over-Running Clutch, (2) the Hilliard Single Revolution Clutch, (3) the Hilliard Centrifugal Clutch, and (4) the Hilliard Friction Clutch and Friction Cut-Off Coupling is

now being issued by The Hilliard Corp., 117 W. 4th St., Elmira, New York. The purpose of these bulletins is to outline in brief the merits of the various clutches by describing in concise form the operation for which each clutch is intended and presenting pertinent information concerning the mechanical de-tails of each. The bulletins also discuss some of the typical applications of the clutches and their use in modern industrial engineering facilities: Copy of either or all bulletins free upon request.





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This Alnor Pyrometer is a twocircuit surface mounting type designed for simple conduit wiring at back or base of the case. This instrument is ruggedly constructed and designed for consistently accurate performance.

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"The Handlest Rack in the Shop" is the title of a four-page folder published by Wm. S. Yohe Supply Co., 505 Gibbs Ave., N. E., Canton 4, Ohio, illustrating and describing its 4 and 5-arm bar stock racks. Copy free upon request.

Executone Communication Systems is the subject of a catalog-survey chart prepared by Executone Inc., to enable the busy executive to analyze his communication requirements and, at the same time, obtain from Executone's engineering department a detailed proposal outlining a communication system planned to his individual requirements. Copy of catalog-survey chart may be obtained by writing to Executone Inc., 415 Lexington Ave., New York 17, New York

Dix Universal Joint 1944 Catalog. Prepared particularly for the designer, engineer, purchasing agent, and other individuals concerned with the use or procurement of universal joints, this 24-page catalog, released by Dix Mfg. Co., Dept. MMS, 603 E. 55th St., Los Angeles 11, Cal., discusses the history and manufacture of Dix precision ground aviation type universal joints and includes illustrations of specially designed machines used to finish these joints to split-thousandth degrees of accuracy. It also contains illustrations of various types of Dix joints for special requirements, table of specifications and prices, and other data.

In addition, the catalog presents condensed information on two new Dix special accessories for increasing lathe production—the Dix-Wilder multiple carriage stop and the Dix-Wilder automatic collet closer. Copy free upon request.

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log KF, the most complete of its kind.

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CAST IDON DI ATES

CAST IRON PLATES

30" x 40"

These plates run 4" to 5" thick—are channeled and represent a rare bargain.

Can be supplied with top and bottom surfaces ground and sides machined square or surface ground only.

They will make perfect layout or surface plates. May be used as hot plates by circulating steam through channels.

Write today for price and delivery covering your requirements.

Mechanical Die & Tool Co., Inc.

11 New York Avenue Brooklyn 16, N. Y. Why Use A Shaper to cut Keyways when a

DAVIS KEYSEATER

will do the job so much quicker and better?

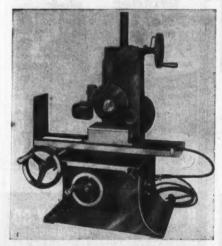
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DAVIS KEYSEATER CO.

Exchange and Glasgow Sts. ROCHESTER, N. Y.

Sanford Precision Bench Surface



Grinder

A HIGH SPEED GRINDER FOR ALL SMALL PRECISION WORK

Write for Specifications
Bulletin No. CM
Dealer Inquiries Invited

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SANFORD MFG. CO. 1279-81 SPRINGFIELD AVE. IRVINGTON 11, N. J. "Solutions to Some Executive Problems" is the title of an attractive 24-page brochure released by Pioneer Engineering & Mfg. Co., Detroit 3, Mich., which very briefly and quickly tells the story of this organization in terms of services rendered. The brochure poses many questions which, it is claimed, will stimulate men's thinking in new channels and will provide executives with valuable suggestions in dealing with approaching production problems. Copy is available to any executive addressing a request on his company letterhead.

Archer & Smith Carbide Cutting Tools. A 16-page catalog containing well-organized data on standard flat carbide cutting tools has been prepared by Archer & Smith, Ltd., 125 N. Eastern Ave., Lexington 34, Ky. Along with this data, the catalog takes the reader on a quick tour of the company's plant, showing its facilities for producing special carbide and high speed steel cutting tools to blueprints, as well as standard tools. Copy of Catalog No. 943 free upon request.

NEW - WHIP TOOL GRINDER



Sharpening milling cutters, lathe tools, and many other small tools. Holds diamond while dressing wheel, straight or radius. Holds in locked position to desired degree or angle.

WHIPPLE MFG. CO. Spirit Lake, Iowa Studies in Arc Welding. An announcement has been received from The James F. Lincoln Arc Welding Foundation, Cleveland, stating that the volume "Studies in Arc Welding" described on page 357 of the August, 1943, issue of MODERN MACHINE SHOP has been completed and is now being offered at a price of \$1.50 per copy postpaid anywhere in the United States; \$2.00 elsewhere.

Requests for copies of this 6 x 9-inch, semi-flexible leather bound book should be addressed to The James F. Lincoln Arc Welding Foundation, P. O. Box 5728,

Cleveland 1, Ohio.





BRADFORD METALMASTER LATHES

141/2" - 161/2" - 181/2" Swing

TOOLROOM AND ENGINE TYPES

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CAM FEED
UNIT TYPE
DRILLING AND
TAPPING
MACHINES

The Bradford Machine Tool Co. Evans at 8th St. Cincinnati 4, Ohio

SHELDON ARBOR

SHELDON offers a complete line of Arbor Presses—10 sizes; capacities from 3 to 10 tons; Bench and Floor types with Simple, Compound or Pilot Wheel operating Levers. They are quality tools improved in design and accurately machined, are stronger, handler and more versatile. They have round rams which simplify jig design and can be held in accurate alignment where desirable with SHELDON petented R am Aligner. Geers are

Aligner. Gears are non-stripping alley steel.

Write for Catalog sheet.

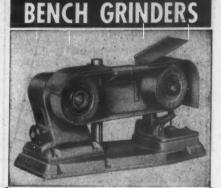


SHELDON MACHINE CO. INC.

4250 N. Knox Ave. Chicago, U. S. A.

February, 1944

GRIND 'EM √SMOOTHER √FASTER √BETTER with JONES



On all production grinding and polishing of small tools and parts, use Jones Bench Grinders. Jones Grinders, equipped with fast-cutting abrasive belts give you smoother, better finishes.

WRITE FOR BULLETIN No. 135

Other Jones Equipment includes Floor-Type Backstand Idlers, Swing Grinders and special equipment. Check Jones on all your grinding needs.

JONES ENGINEERING

Dept. 8-2 ELLWOOD CITY, PA.

Abrasive Belt Grinding Specialists





That's the big reason why you should use a Ziegler Floating Tool Holder in tapping and reaming. By compensating for spindle misalignment up to 1/32", it makes possible perfect work even in case of inaccurate set-up.

ser-up.

If you are handicapped by inexperienced help, the Ziegler Tool Holder may prove to be the solution of your difficulties, speeding up production and cutting down costly spoilage losses.

W. M. ZIEGLER TOOL CO. 1924 Twelfth St., Detroit 16, Mich.





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Cleveland

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STEEGE MOTOR DRIVES FOR DEFENSE GUARANTEED FOR FIVE YEARS

No chance of breakdown, doing a good job power-ing machines for defense production. No noise, floating cone, results 100% power. 8 years of production proef of durability. Easily installed.

PRICED AT \$40
AND UP.

FOR LATHES,
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W. L. STEEGE MACHINERY CO.

U. S. HEADS

STANDARD SINCE 1915



The United States Drill Head Co.

1954 Riverside Drive CINCINNATI, OHIO

Yes, these screws save Time and Space!



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No matter how close to a corner or flange you put Mac-it hexagon socket screws, there's plenty of room to drive them. Use this advantage to save space.



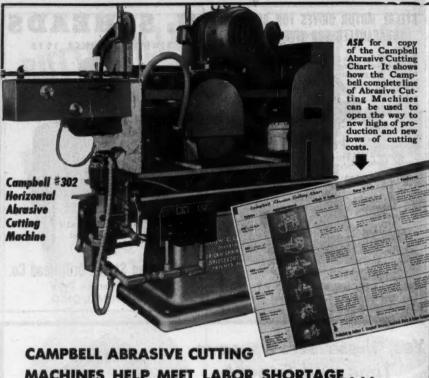
Mac-its are heat-treated to give far greater strength than plain steel screws. With that extra holding power, you may be able to use fewer screws—save drilling and tapping time.



OTHER MAC-IT PRODUCTS INCLUDE: Socket head and hexagon head cap screws, stripper bolts, hollow and square head set screws, hexagon socket pipe plugs.

Strong, Carlisle & Hammond Company

Cleveland, Ohio



MACHINES HELP MEET LABOR SHORTAGE . . .

According to WPB, the peak of the skilled labor problem has yet to come. If you cut any of the annealed or unannealed steels, non-ferrous alloys, plastics, glass or ceramics—solid bar, tubular or flat stock—a Campbell Abrasive Cutting Machine will help you.

Tell the Campbell Engineering Department materials, shapes, sizes, lengths before cutting, lengths of cut off pieces and hourly production required. They'll give you data without obligation.



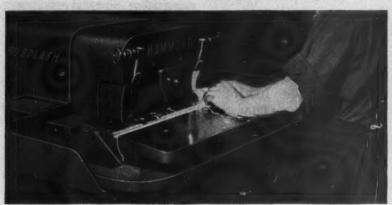
ABRASIVE CUTTING MACHINES

ANDREW C. CAMPBELL DIVISION · Bridgeport, Connecticut

AMERICAN CHAIN & CABLE COMPANY, Inc.

Met Tool GRINDERS

FOR CARBIDE AND HIGH SPEED, TOO



LOOK! Hammonda NEW 10" and 14"

Provide many improvements over previous models: cup wheel safety discs — free flowing, fully adjustable coolant spouts — and splash pans. Under all conditions No spray-No splash grinding is assured. "You're dry when you grind wet!"



WRITE FOR BULLETIN 204 Hachinery Builders
KALAMAZOOSA. MICHIGAN

1615 DOUGLAS AVENUE
Enstern Branch: 71 West 23rd St., New York 10, N. Y.

Continuous, 16-Hour Shift Proves Easy for CURTIS MODEL AIR COMPRESSORS

The Stewart Iron Works. Covington, Kentucky, operates two Curtis Compressors continuously for eight and sixteen-hour shifts against 100-lb. pressure service—supplying air to riveting guns, bulls, furnaces, and pneumatic tools.

Because of the completely satisfactory performance of their first Curtis Model "C" Air Compressor over a period of six years, the Stewart Company installed the second one to handle



their increased demand for air . . . a tribute to the dependability and economy of Curtis Air Compressors for industrial uses.

Curtis (Timken Bearing Equipped) Compressors Offer:

Large capacity per dollar of first cost High volumetric and mechanical efficiency Exceptional air delivery per unit of power input Low maintenance expense and oil consumption



For full information on the advantages of Curtis Model "C" Air Compressors, write for free booklet, "How Air Is Being Used in Your Industry."

CURTIS PNEUMATIC MACHINERY DIVISION

of Curtis Manufacturing Company

1913 Kienlen Avenue

St. Louis, Missouri



Wide Range of Work

The Gorton 16-A produces an almost endless variety of short or long, stender parts — diameters .005" to 7/16", lengths 1/22" to 23/4"—complete in one operation.

It does step turning, generates curves, tapers, back recesses, knurls, chamfers, etc. It centers, drills, slots, threads or taps.

Tool slides are easily accessible. Micrometer adjustments for all tools insure accurate, quick setups at low cost. Centralized finger-tip controls provide infinitely variable spindle speeds (1100 to10,000 R.P.M.) and infinitely variable cam feeds (20 to 720 pieces per hour; 20 to 1440 optional). No speed or feed gears to change.

GORTON Complete Cam and Tool Service For Any Make Swiss-Type Screw Machine - Garton or Others

Gorton exclusively offers a complete cam and tool service. Highly skilled engineers are available to take care of all your needs. This service consists of a detailed cam and tool layout, listing all operations of the machining cycle together with necessary cams, tools, collers and bushings. This service is available at the Gorton factory at Racine, Wis., for the Midwest and Pacific areas; and from Russell, Holbrook, and Henderson (our Eastern Distributors) of New York City for quick service in the East.

How This Job

TOOLING: 4 standard single-point cutters. 4 flat cams.

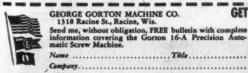
SEQUENCE OF OPERATIONS:

1—Turn 30° taper ½4" long and turn 2° to 3° taper ½2" long to diameter of .0495" (±.0005"). 2-Advance headstock .205" and plunge cut for 3/44" diameter of .0495" (±.0005").

3-Turn taper 2° to 3° 1/32" long and turn 30° taper 1/64" long. 4-Cut off finished part.

MATERIAL: 5/4" dia. S.A.E. No. 1060

PRODUCTION: 10 pieces per minute.



GET THE FACTS





GORTON MACHINE

GEORGE GORTON MACHINE CO.

MILL-WITH Carbiales,

CTANDARD and special carbide-tipped Cal-Cutters are outstanding for a range of milling jobs on alloy and heat-treated steels, cast iron, dural, aluminum, brass, bronze-and many other metals. Extra-heavy carbides rigidly mounted in a husky body are designed to mill at high speeds and feeds on the average modern milling machine ... with less downtime for resharpening, superior surface finishes—and lower costper-piece over high speed steel tools!



New Cal-Cutter Catalog M-1 illustrates and describes latest Cal-Cutter designs, provides ordering information, gives helpful operating tips—write for your free copy. No obligation.













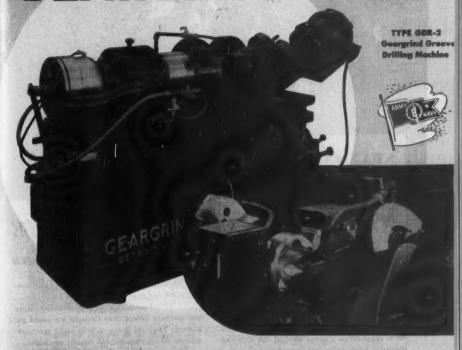
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MACHINERY MANUFACTURING COMPANY

Version Line of HORIZONTAL MILLS, VERTICAL MILLS and UNIVERSE AND GRINDERS

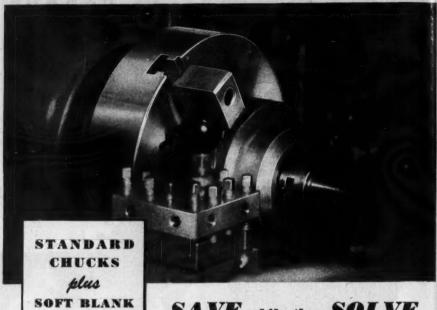
GEARGRIND GROOVE DRILLING MACHINE



Drills roughed-out ball grooves on Reeppa Constand Velocity Universal Joint. Drill motion is in an arc, adjustable to arcs with radii from 1½" to 3". Feeding and indexing hydraulically controlled. Air chuck work clamp. Hydraulically operated steadyrest. Work indexes and repeats. Automatic feed to predetermined depth. Rapid traverse to and from work.

Our general catalog describes the complete line of GEARGRIND Machines for the Formed Wheel Grinding of external and internal gears, external and internal involute splines, straight splines, serrations and racks, as well as special machines for special jobs—worm grinders, slot grinders, and groove drilling machines.

MACHINE COMPANY



... SAVE while they SOLVE tough set-up problems

WITH the development of the American Standard two-piece jaw construction, it became very easy to hold work of unusual shapes or dimensions in standard chucks simply by machining a set of soft blank top jaws to the required form. This saved a great deal of the time and material previously put into construction of special work-holding devices and also made it

possible to quickly change a machine over from one job to another by merely exchanging the removable top jaws in the chuck.

JAWS



This is typical of the time and material saving short cuts that ... in a thousand little ways... have enabled American Industry to out-produce our enemies before they thought we could get started. They are going to help make reconversion to civilian production equally successful.

Let Cushman work with you on present and future work-holding problems... and in the interests of Tool Conservation. The Cushman Chuck Company, Chucking Engineers Since 1850 Hartford 1, Conn.

A WORLD STANDARD FOR PRECISION



CUSHMAN CHUCKS



The "thumbs up" grip that women generally use in operating the new Thor "Armored in Plastic" drill also expresses the way they feel about this remarkable new tool—they like it!

They like its 14% less weight! With housings of light but sturdy "Thorite" plastic, these heavy duty portable electric drills weigh fully 14% less than previous types. That means less fatigue and greater productiveness.

They like its new handling ease! The perfect balance and trim lines of the new Thor drills, plus the "kind" feel of the plastic housing itself, provide handling case never before possible.

They like its cooler operation! The new Thor "plastic" drills run cooler for two reasons. The

plastic "Armor" is a non-conductor of heat. The oversize Thor fan and ample intake and exhaust slots circulate generous amounts of cooling air through the machine.

They like its greater power! The new Thor "Plastic" drills, powered by the famous Thor high torque, over-capacity motor, develop more power per pound.

You, too, will like the way these new Thor "Armored in Plastic" portable electric 1/4" drills point the way to top speed production. If yours is a war industry, Thor's quantity output will enable you to get them quickly! Ask for full details.

"Tools are weapons - treat 'em right,"



INDEPENDENT PNEUMATIC TOOL COMPANY



100 W. JACESON BOURFYARD, CHCAGO, St.

BIG

little things with



JOBS

Ultra smoothness and extreme accuracy in the mechanical world mean more efficient operation, more dependability, longer life.

It is the *forte* of honing and superfinish stones to create ultra smoothness and extreme accuracy; to create those physical attributes far beyond the capacity of anything else man has yet contrived.

MID-WEST MICRO BOND honing and superfinish stones have blazed many new trails in the field of superb finishes and extremely close tolerances. Many of Uncle Sam's weapons of war-tanks, guns and planes—owe a portion of their deadly efficiency to a MID-WEST honing or superfinish stone often smaller than a match. Truly such tiny items are little things with big jobs!

MID-WEST honing and superfinish stones—the world's most efficient abrasives—come in any size, any shape, any grain, any grade. They last longer, cut faster and produce smoother surfaces with less heat.

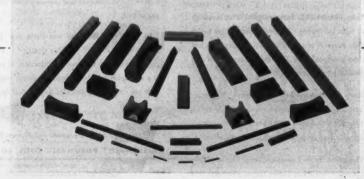
MID-WEST ABRASIVE COMPANY

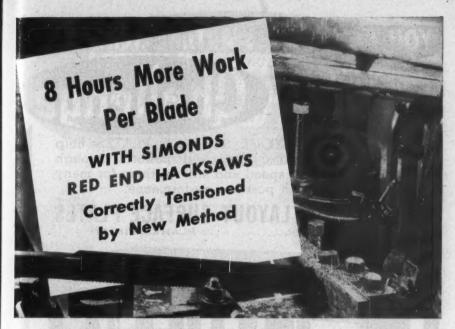
Manufacturers of DEPENDABLE Abrasises

1960 E. Milwaukee Avenue

Detroit 11, Michigan

MID-WEST'S complete line of abrasive products also includes grinding wheels for any purpose, coated abrasives of any type and compounds. Let a MID-WEST service engineer tell you what MID-WEST abrasives have done for others, You'll be amased!





In cutting stainless steel bars, one plant could get only about 9 hours from a hacksaw blade ... and many cuts were concaved because of incorrect blade-tension. Then a Red End Blade was put in the same machine ... correctly tensioned by Simonds' new technique ... and delivered 17 hours of straight, smooth cutting, almost double the former blade-life.

You can get comparable re-

sults on your own power hacksawing operations. Have your Industrial Supply Distributor bring a Simonds engineer to demonstrate this new tensioning technique right on your own machines. Get in touch now with your distributor, or with the nearest Simonds branch office.

Shorten the War...BUY BONDS!

1350 Columbia Rd., Boston 27 • 127 S., Green St., Chicago 7 • 228 First Ave., San Francisco 5 • 311 S.W. First Ave., Portland 4, Ore. • 520 First Ave. So., Séattle 4, Wn. SIMONDS
SAW AND STEEL COMPANY
MASSACHUSETTS

PRODUCTION TOOLS FOR CUTTING METAL, WOOD, PAPER, PLASTICS

YOU CAN MEET WARTIME SCHEDULES

WHEN IT'S A...

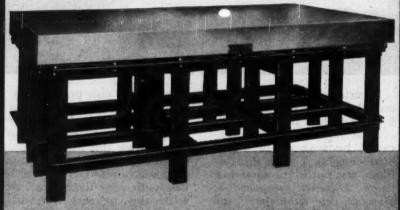
Challenge

CHALLENGE LAYOUT SURFACE PLATES help "step-up" schedules. They will perform through solid days at top speed and still be there for many years of post-war performance.

CHALLENGE LAYOUT SURFACE PLATES

SEMI-STEEL

PLANER FINISH



Built of fine-grade, special analysis semi-steel, these Plates make a true, rigid surface for layout, inspection or assembly work. Specially grooved or machined "Tee-Slot" surfaces for specific checking or assembly operations are available on order.

AVAILABLE WITH OR WITHOUT ALL-STEEL STAND

Challenge Layout Surface Plates and the all-steel, arc-welded stand give the solidity of one piece construction. Stand equipped with lock leveling screws. Surface sizes from 30"x60" to 54"x144". WRITE FOR FULL DETAILED INFORMATION.



THE CHALLENGE MACHINERY CO.

GRAND HAVEN . MICHIGAN

to

Why Industry Prefers WALKER-TURNER 20" DRILL PRESS!



- 1 Double row bell bearing for thrust
- 2 Sall bearing near spinele center elds
- 3 Sall bearings above and below pulley
- S, eliminates whip.
- 4 Ten spline spindle improves accuracy.

 5 Aluminum alloy spindle pulley permits
- 6 One place head castine, bared in line.
- 7 Pulleys and belt amply guarded, yet
- 8 Steel quill turned from bar, seats bored and rack milled in quill.
- 9 One piece feed pinion and shaft, with teeth cut on gear hobber.
- 10 One-shot lubrication oil applied at
- 11 No. 2 Morse Toper Spindle Naco.
- 12 Power feed take-off pulley. Feed coor-



The sectional view above illustrates the careful design that provides an unusually smooth-running spindle in Walker-Turner 20" Drill Presses. These rugged produc-

tion machine tools are in use in great numbers in war industries today. Due to their versatility, many have been applied in special tooling set-ups of various kinds. Simplicity of controls permits their use by unskilled and semi-skilled labor — an important point under present conditions as well as in the post-war period.

Send for descriptive literature

WALKER-TURNER CO., INC., 724 Berckman Street, PLAINFIELD, N. J.

Furnished in bench, floor and multispindle models — with or without power feed. Capacity ¾" in steel, 1" in cast iron, Spindle speeds 260 to 2600 r.p.m.



MACHINE TOOLS

DRILL PRESSES - HAND AND POWER FEED. . RADIAL DRILLS
METAL CUTTING BAND SAWS . POLISHING LATHES . FLEXIBLE SHAFT MACHINES
RADIAL CUT OFF MACHINES FOR METAL . MOTORS . BELL & DISC SURFACERS

A Group of four benches served by single Roto-Clone unit with after-cleaner for small

 Grinding table with rotating grill to facilitate working.

> 3 Special Roto Clone grind ing bench with filter after cleaner for flexible

4 Booth type bench for magnesium casting finishing.

ROTO-CLONE

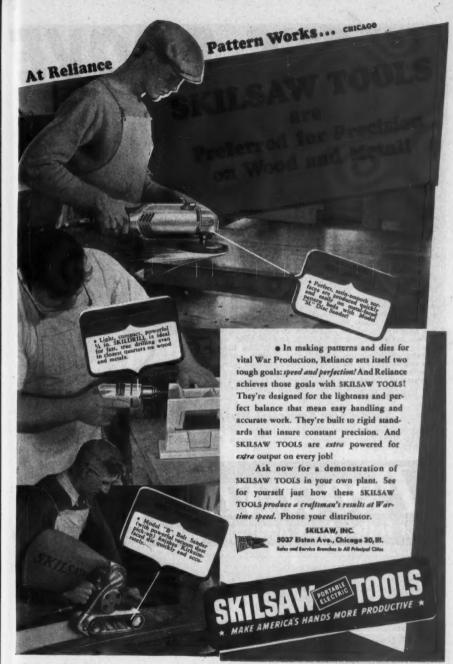
Dust Control

GRINDING BENCHES SPEED PRODUCTION

Shown on this page are some of the special AAF Roto-Clone grinding benches designed to meet specific needs in war production plants. Complete information on each will be sent on request.

AMERICAN AIR FILTER COMPANY, INC.

100 Central Avenue INCORPORATED Louisville, Ky.
In Canada: Darling Bres., Ltd., Montreal, P. Q.



TESTS PROVE

that this Universal Tapping Machine affords

- **GREATER SENSITIVITY**
- INCREASED OUTPUT
- LESS TAP BREAKAGE

Actual comparative tests in shops by users of Procunier Tapping Machines prove that these machines definitely speed up tapping operations, do more accurate work and reduce tap breakage. There are specific reasons for this superior performance of Procunier machines: 1. The improved Procunier tapping head with double-cone cork face friction clutch and other exclusive features; 2. Four speeds, ranging from 390 to 2050 RPM. efficiently handle jobs for which conventional high speed tapping machines are inadequate; 3. One machine handles tap sizes from No. 2 to ½" through two interchangeable heads; 4. Extra long Spiral Compensating Springs conveniently located, with wide range hand screw adjustments, maintain pre-set tap feeding and reversing presents, maintain pre-set tap feeding and reversing presments, maintain pre-set tap feeding and reversing pres-sure INDEPENDENT OF OPERATOR.

Send for Special Bulletin

giving full details and prices on the full line of Procunier Universal Tapping Machines, Procunier Precision Tapping Heads and the new Tru-Grip Tap Holder.

ROCUNIER

For Faster, More Accurate Tapping

THE PROCUNIER SAFETY CHUCK CO.,

12 S. Clinton St., Chicago

Send me bulletins on:
Universal Tapping Machines,
High Speed Tapping Heads,
Tru-Grip Tap Holders.

Name

Address

COUPON TODAY

STAGES IN THE GRINDING OF A SOSSNER

OCTUPLE THREAD TAP

(8 STARTS)

A tap that calls for the highest degree of tap-making skill. Each start must be precisely indexed and then precision ground for perfect size, lead and thread spacing on the

finished tap.

Step 1 Step 2 Step 3

Step 4

STEEL STAMPS

Step 6 Step 7

Step 8

FINISHED TAP

SOSSNER

CUTTING TOOLS

161 Grand St., New York City 13, or 27 Broadway, Lynbrook, N. Y.





Production Drills

"Buffalo" Drills make it easier for the operator to turn out precision work—even under emergency speeds. The basic reason for this is the "Buffalo" design — drilling machines "geared" to the men and women who operate them. All controls are located for fast and easy manipulation—with a minimum of muscular fatique.

"Buffalo" Drills practically "run themselves"—enabling even unskilled labor to keep up with production schedules and deliver precision drilled work. The "Buffalo" line includes a wide range of models and sizes for practically all metal drilling applications. Engineering details on request.

BUFFALO FORGE COMPANY



388 Broadway Buffalo, N. Y.

Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

Buffulo

DRILLING MACHINES

MODERN MACHINE SHOP

February, 1944

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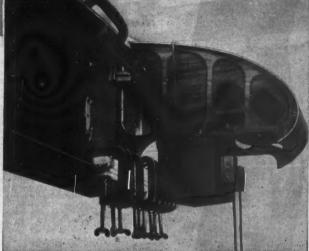
THE

February

The Choice of Loading

Aircraft Builders...

HARGRAVE Super Clamps in use at Beeth Aircraft Corporation. Photo shows Clamps applying heavy pressure to a glue joint on wood center section of the plywood BEECHCRAFT AT-10 Advanced Pilot Trainer. This was an experimental set-up, later adapted for production purposes. Heating lamps (in box at right of Clamps) accelerate glue-joint drying.

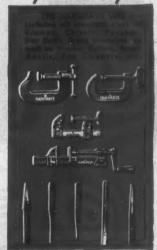


HARGRAVE "Superclamps"

Help Speed Plane Output at Beech Aircraft Corporation

HARGRAVE Clamps are widely used in the manufacture of modern aircraft—at the Beech Aircraft Corporation, Wichita, Kansas, and at other leading aircraft plants. Since 1879, these quality Clamps and other Tools made by The Cincinnati Tool Company, have been the accepted standard of excellence—individually tested for strength and durability.

We're working 24 hours a day to supply war needs and fill other orders. See your supplier; he'll gladly cooperate.



4051 Montgomery Rd., Cincinnati 12, Ohio

THE CINCINNATI TOOL CO.



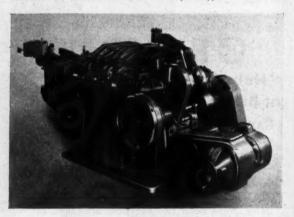
Automatic Production of

INTRICATE

Metal Parts from Coil Stock on the U. S. MULTI SLIDE

If your production program involves the fabrication of intricate metal parts calling for piercing, blanking, forming, swaging, and embossing operations, the U.S. Multi-Slide Machine should be of particular interest to you. These machines are made in a number of sizes to accommodate stock of variou: widths, thicknesses, and feed lengths. Each standard Multi-Slide is equipped with four slides, one stripper, and one die head which are cam operated from the shaft system. The die head accommodates a die set in which may be mounted piercing, trimming and preliminary forming tools. The slides accommodate the final forming tools.

Many jobs can be handled on the machines with standard equipment. The nature of certain parts, however, necessitates auxiliary equipment such as: Toggle Press or Lever Press on the larger machines (for heavy duty swaging and embossing operations), cut-off slide for use when it is advisable not to cut the part away from the strip until the final forming operation, additional die heads, wire straightener in place of flot stock straightener, auxiliary slides, etc. Illustrated below is the No. 33 U. S. Multi-Slide Machine equipped with two Die Heads. Drawings at the left illustrate interesting applications. Complete specifications for the U. S. Multi-Slides will be found in Bulletin S15. Ask for your copy.



TYPES OF PARTS HANDLED TO ADVANTAGE ON THE U. S. MULTI SLIDE

Metallic Belt Links for holding machine gun bullets e Automobile Accessories e Parts for Office Machines e Radio and Radio Tube Parts e Electrical Appliances e Hardware Specialties e Safety Razors e Book Bindings e Electrical Contactors e Kitchen Utensils e Bearings e Automatic Pencils.

U. S. TOOL COMPANY, INC., AMPERE (E. ORANGE), N. J.

Builders of U. S. Multi-Millers, U. S. Automatic Press Room Equipment, U. S. Die Sets and Accessories

10



Wherever you are located-East, West, North, South-there's a Weldon representative within easy reach of you, ready and willing to give you prompt, intelligent service. When you need End Mills, Screw Machine Cutting Tools, or other Weldon Tools, write or telephone the nearest representative listed below:

CAMPBELL HARDWARE & SUPPLY CO. 108 First Avenue, Seattle 4, Wash.

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CANADIAN FAIRBANKS-MORSE CO. 26-28 West Front Street Toronto, Ontario 1, Canada

SUPPLY CO. 257 Wayne Ave., Dayton, Ohio

P. O. Bex 1465, Avendale, Ariz.

ENGINEERING SALES CO. 12 Portwood St., Houston 1, Texas

ENGINEERING SALES CO. 1124 Allen Bidg., Dallas, Texas

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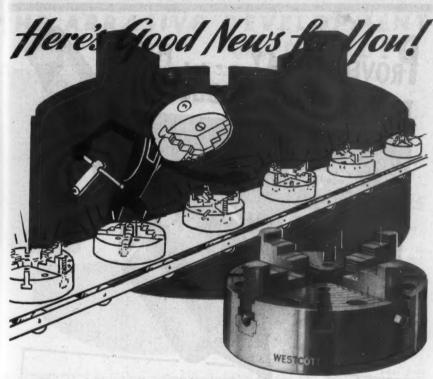
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February, 1944

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"Will pay for itself many times over in the saving of scrap parts and time"

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The drawing shown above is of a steel part from a 20 MM dircraft gun. By former methods of honing, too many of these parts were being rejected because they were being cut oversize with no means of salvaging them.

A consultation with a Sunnen Service Engineer led to the installation of the Sunnen Precision Honing Machine to handle these finishing operations.

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Typical Uses

SUMMEN.



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Stainless Steel Load Compensator Valve Seat, Hale



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Bearing. A very small part, 2 micro-inch finish nec-



Aircraft Valve Tappet Roller. Honed after grinding to give 100% bearing



Automobile Distributor Shaft Geers. Taper removed at a rate of 80-90 mer hour.

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WILLIAMS DROP-FORGED TOOLS

THE PROPER USE OF OPEN-END WRENCHES . . . Data Sheet No. 22

First, select a wrench with the correct size opening for the nut or bolt to be accommodated. Test this by the amount of free back and forth movement of the wrench on a stationary nut. Too large an opening may slip under a hard pull and injure you, the nut, or the wrench.



Any wrench will perform best and with highest strength when squarely and fully seated on the nut or bolt head as shown above. Pull straight, avoiding side strain or



"cramping" of the wrench. Nine times out of ten you will find it safer to pull rather than push on a wrench. Greasy hands... or greasy wrenches... are dangerous. A dry, clean grip always permits the hardest, safest pull and helps to reduce accidents.

Never use a wrench with a badly worn or chewed and spread opening as pictured above—particularly on hex nuts. Williams' Wrenches are stamped with the nominal size of their openings; that is, the size of the nut or bolt head across the hex or square flats. Openings are made. 005" to .040" (proportionate to size) larger than the nut or bolt head they are intended to fit. It is, therefore, easy to detect spread openings.

Standard commercial wrench leverages are such that an average man can readily break bolts or strip threads up to 5/8" bolt diameter. Consequently care should be exercised and a sense of "feel" developed. Bolts larger than 5/8" seldom can be set up too tight will verage wrench

leverages. If you must use auxiliary leverage on large bolt sizes, such as a pipe extension over the handle, make sure the two are strongly and well coupled. The best and safest procedure is to purchase special wrenches with extra long handles.



Never hammer an ordinary wrench handle as a substitute for increased leverage. Striking-face wrenches, (see above illustration) made specially for this purpose, should be used. A vast amount of energy is stored in several sharp hammer blows, and ordinary wrenches are not designed to withstand this abuse.



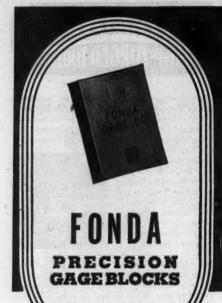


When the usual open-end wrench is operated in close quarters on hard-to-get-at nuts, it should be remembered that "flopping" the wrench upside down between swings gives an angular advantage which permits continuously rotating the nut, or bolt in the least possible space. By this "flopping" trick, illustrated above, the usual 15° angle wrench will operate a hexagon continuously where the swing is limited to 30°; otherwise 60° would be necessary.

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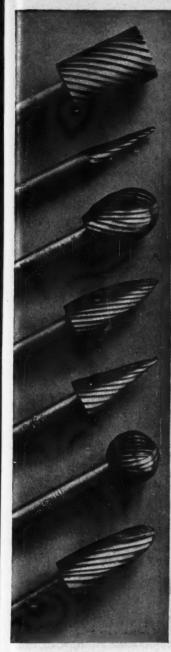
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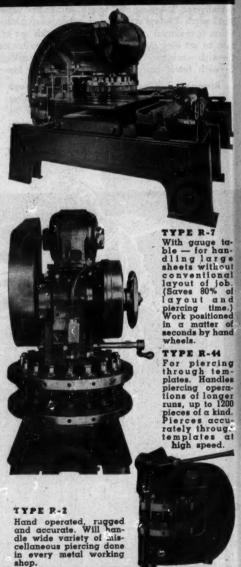
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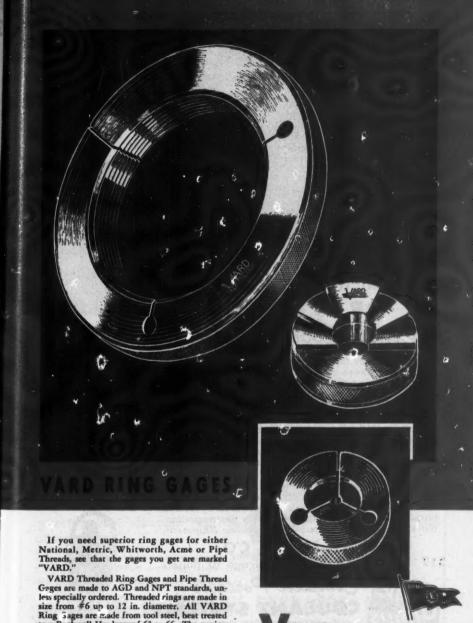
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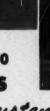
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R-103	L-104	% x % x 21/2
R-105	L-106	To X To X 3
R-107	L-108	1/2 x 1/2 x 31/2

SERIES 100

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Tool No.	Shank Size		
200	1/4 x 1/4 x 2		
201	18 x 18 x 21/4		
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203	76 x 76 x 3		
204	1/4 - 1/4 - 21/4		



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The Last Word . . .

Post-War Plans

A LTHOUGH the war is far from won, a great deal is being said these days about post-war planning. Some 12 or 13 committees have been set up, under various auspices, to study the national economy and try to point the way to a continuation of prosperity when the war is done and the necessity for fighting materials will have ceased.

This is all to the good, but, as the National Small Business Men's Association points out, the effectiveness of the proposed plans will depend to a large extent upon the financial positions of the many firms who will be expected to make the plans effective. In other words, will they have working capital?

The government has been setting pretty tight limits in its renegotiation policy; in some cases, much too tight. Not that we advocate letting everyone get away with whatever they can, such as, for instance, giving a stenographer a \$40,000 bonus, but every firm should be allowed to set up enough reserve so that it can reconvert to peace-time production and buy the necessary new equipment without having to borrow from the bank.

Next to tomorrow's battle, the thing that is uppermost in the minds of the boys "over there" is whether they will have jobs when they get back. And the minute an armistice is signed, that job will be the most important subject to everyone. Whether those jobs will be available will depend not only upon having good plans, but upon having the money to put them into operation.

The government should not overlook the fact that a prosperous peace can only be ensured by having a prosperous industry, and failure in peace will be letting America down unnecessarily.

A Bad Record

DESPITE the fact that, two years ago, three great labor organizations in the United States pledged the government that no strikes would be called during the war, the national crisis was flouted by the calling of 3,425 walkouts during the first 11 months of 1943, according to Bureau of Labor figures. This was an increuse of more than 15 per cent over the entire year of 1942.

During the period indicated, the manhours lost through strikes, according to Labor Bureau statistics, amounted to the huge total of 12,785,000 hours. The coal miners were, of course, responsible for the greater part of this waste. But all of these strikes were called at a time when production was badly needed.

This is a bad showing for organized labor. The fact that these men could lay down their tools and walk off the job when America is virtually fighting for its life showed where they stand in this fight. It showed, for one thing, that the word of the union officials doesn't mean much. For another, it showed complete lack of capacity to understand the danger with which the nation is faced. And finally, it showed that wage increases were of more importance to the members of the striking unions than the lives of the men who are facing death in Italy and on the seas and in the jungles that the America we know may be saved for just such people as these strikers and their families.

This shameful showing is due to a combination of bad union leadership and a lax government policy with regard to union labor. It is time that the more intelligent men in these unions took some hand in the running of their organizations, and made some move to offset the discredit that these unions have brought down upon themselves.

Howard Campbus



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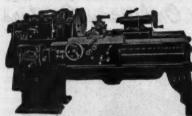
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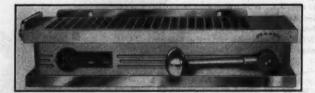


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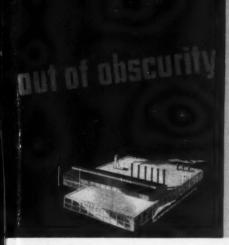
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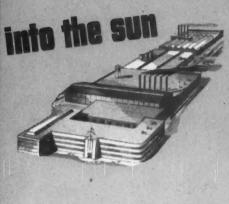
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There is a brighter side. From \$319 in 1914, net income per capita in these United States climbed to \$875 (est) in 1943. Increase in cost of living jumped 76% in the 1913-1918 period of War I. The first five years (1938-1943) of World War II show a climb of 24%. Close of 1944 may well see an accumulated "buying reser-

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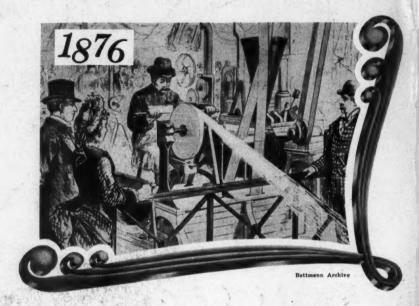
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A "Production Miracle" in the Days of the Philadelphia Centennial Exposition



. but today!

The above scene is from the Government Building at the Philadelphia Centennial Exposition in 1876. Engitled "Miracles of Modern Grinding," it shows the method used in burnishing bayonets. Yes, indeed, this was a "production miracle" for those days. But compared with the standards of today, there just was no such thing as production. Note the work being held by hand. Perhaps the greatest single improvement over the

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Bench Lathe with Bearing Equipped ree-turning, smooth, and tterless; and the keen-turning team that keep both corn and production at a muly high level in the facture of dies for cold ling machines.

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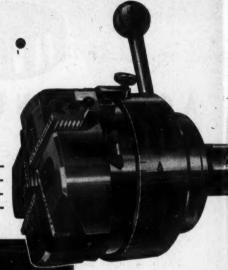
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LANDIS MACHINE COMPANY WAYNESBORO, PENNA., U. S. A.



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Boring bronze wrist pin bearing in master rod on Heald No. 48A Bore-Matic.



Internal grinding 16 knuckle pin holes in master rod on Heald No. 172 Gap Internal.



Surface grinding shoulders and faces on master rod on Heald No. 25A Rotary.

Borizing - Internal Grinding - Surface Grinding

944



CINCINNATI HYPRO DOUBLE HOUSING **PLANER**

produces bearing strip slots in a stern tube for a Navy ship's main propeller shafts. The bottom of the slots were rough cut. Two other tools, visible at the top of the toolholder. will be used for taking dovetail cuts on the side of each slot

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cutters designed primarily for machining cast iron do not produce a good finish on soft steel, and fail utterly when used in milling the harder materials?

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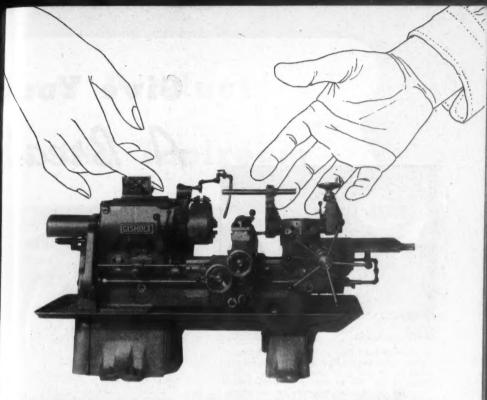
Easy to Operate... Women quickly master the simple controls. Large hand conveniently located, provide rapid yet sensitive adjustments; permit continuous operation with minimum fatigue.

Easy to Maintain . . . Few moving parts. Built-in motor integral with head. Abrasive design assures years of satisfactory service. Recommended for finest type of flat, form and gage grinding.

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This Postwar Improvement Couldn't Wait

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Why save an important improvement like this for postwar announcement? It's needed now to speed up war production. It's available now, as standard equipment, on all Gisholt Ram Type Turret Lathes. If you'd like more detailed information, write us.

GISHOLT MACHINE COMPANY

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... Look Ahead ... Keep Ahead ... With Gisholt

Give YourN A Breaking



An Internal job. Here the internal Grinding Attachment has been pulled down into position for grinding the bore in a short shaft to an accurate plug-tage fit. The attachment is standard equipment and the standard equipment and the standard equipment of the standard equip-



An Evernal job. Grinding the taper—31/2" per foot —on the shank end of an attachment driving gest Notice the Internal Grinding Autohment on the front of the wheelhead. The attachment is up and out of the way but ready for instant use.



A Face grinding job on the CINCIPINATE Hydraulic Universal



Left: Hydr

urNew Product in the Toolroom

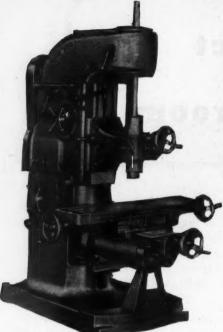
The first few samples of your new product for tomorrow's market must be made on machine tools, in the tool room. There, they pass through their most critical period. There, the product can be started on its way to success or failure. With versatile and up-to-date tool room machines for manufacturing the parts, the chances are that the performance of the assembled unit will equal blue-print specifications.

CINCINNATI Hydraulic Universal Grinding Machines have all the qualifications for tool-room work of this type. They will size accurately, within .0001", and produce exceptionally smooth finishes with no extra effort. Changes from external to internal or face grinding may be accomplished in a few minutes. The table continually reverses within .004", enabling the operator to confidently grind close to shoulders.

These few statements give you an idea of the fine work which can be produced on CINCINNATI Hydraulic Universal. Complete information may be obtained by writing for catalog G-486-1 (12" size) or G-474-1 (14", 16" and 18" sizes).



Left: CINCINNATI 12"
Hydraulic Universal Grinding Machine



ACCURACY

of Knight Millers

Through the use of alloyed steels coupled with the precision of work-manship, Knight Millers provide accuracy and speed required in high production work.

Other salient features of these millers include —

- * Large bearing surface on column
- * Heat treated gears
- * Anti-friction ball bearings shaft support
- * Hardened, ground and lapped spiral-bevel gears
- * Simplicity of operation
- * Economy



The table can be tilted to either side or horizontal or it can swivel around the column. Write for illustrated catalog.





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Both 12- and 24-inch machines operate on the same "master involute cam" principle.

No sine bars, base rolls, extra parts or calculations are required.

Fellows Involute Measuring Machines chart involute profiles to a degree of accuracy that has heretofore never been approached. Thus the gear maker can maintain control of gear tooth accuracy at all stages of his manufacturing operations. Charts may be filed as permanent records on each production run.

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Want to grind those very small parts just a bit faster than you are right now?

Practically anyone faced with this problem would quickly answer "Yes." Those who do should ask us for more information about the Landis 4" Type H Plain. If you are already using these machines, on the other hand, you are probably getting the maximum production possible on grinding equipment available today.

Many factors contribute to the productiveness of the Landis 4" Type H. Most important is the availability of a combination of cycles which makes it possible to handle work with the minimum number of manual operations. Of almost equal importance is the Microsphere wheel spindle bearing construction. This permits such close clearances that no appreciable time is required for sparking out at the end of the cut. Other factors are the great weight of the machine and its inherently sound over-all design.

Look at the five typical examples of unusual output recorded on these two pages. If you think such results are not possible in your plant, just challenge us to show you that they are.



Unusual Performance as Usual



Large ball bearing manufacturer grinds small inner ball with a bearing and holding the work formed wheel and holding the work to between centers on an arbor. Production is 130 per hour within immits of 10002" concentricity and .005" stock. Odameter and removing .005" stock. Two arbors are used, the operator unloading and loading one while the loading and loading.

Tap manufacturer performs 4300 operations in 101/2 hours on 1/4 taps. In this period, 2000 shanks are ground in this period, 2000 flutes removing .006" stock and 2300 flutes removing .012" stock.

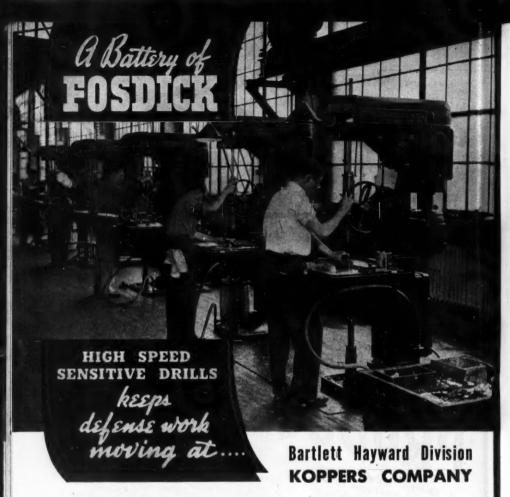
d removing .005. students of the state of the machine. The machine of the machine of the machine. The machine of the machine o

Electrical equipment manufacturer grinds three surfaces facturer grinds three surfaces of a small exceedingly tough of a small exceedingly tough of a steel shaft. These parts are finished from the rough to final size finished from the rough to final size separate operations are performed separate operations are performed with the rate of production that is 1300 with the rate of production, that is 1300 with the rate of production that is 1300

Instrument manufacturer grinds gimbal bal journals within limits of 0,003" and removing 0,008" stock. Each gimbal large journal on one end and a small formal on the other. Both are ground as a part journal on the other simply by turning the journal on the other simply by turning per journal on the other simply by turning per journals are ground per journals are ground per journals are ground per hour compared with production is typical of what journals per hour on a hand operated machine. This increase in production is typical of what might be expected when a modern 4" Type the might be expected when the nature of the work is installed and when the nature of the work being ground is such that a completely under the grinding cycle may be employed.

WAYNESBORO-PENNSYLVANIA

244



Miscellaneous small drilling jobs are kept moving by this battery of Fosdick Drills. For example, Aluminum Bronze Keys requiring two 17/64" holes are drilled complete including loading and unloading time in 1/2 minutes. Another machine drills #15 holes in Steel Rings at the rate of 1 minute each including loading and unloading.

Fosdick Sensitive Drills are designed to meet the needs of small drilling machines up to 11/4" diameter holes. Furnished with single and two speed motors providing a range of 6 to 18 speeds.

Write for bulletin on High Speed Drills for complete information.

FOSDICK MACHINE TOOL COM

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GET AN ANALYSIS OF YOUR

CUTTING JOBS—without obligation

Based on the actual production records of the CAMPBELL complete range—the only complete range—of Abrasive Cutting Machines, Campbell engineers will gladly work up cost sheets and production procedures for your cutting. • All you need do is state the materials, shapes and sizes you are cutting, lengths before cutting, lengths of cut-off pieces and production required per hour. • The schedules given you will be practical and attainable. They will be based on the performance of some one of the 8 types and 19 models of CAMPBELL Abrasive Cutting Machines that are currently cutting all grades of steel, annealed and unannealed, nonferrous alloys, plastics, glass and ceramics—solid bars, tubular and flat stock. • Ask for a copy of the chart shown above, too. It will give you fundamental information on the possibilities of abrasive cutting—at a glance.



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Oscillating and Rotating Wheel, Cuts steel up to 6".



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Campbell No. 213
Cuts Tubing up to and including 3½".
Solids to 2".



later No. 425
Cuts Tubing up to and including 4½".
Solid Bar to 3½"



IN the answer to this extraordinary question is a curious story. For two scientists once posed that very question to themselves . . . and the answer was Yes!

They actually built a machine with the power to "learn" by experience and "remember" what it had learned-a mechanism capable of simulating the rudimentary behavior of a rat. Comprised of solenoids, gears and relays, it traveled a grooved track forked by 12 dead-end side-tracks-equivalent to the blind alleys which a living rat encounters. Set to take the deadend forks, as if by an inner compulsion, this robot rat literally learned by experience to avoid the frustrating blind alleys. in a perfect mechanical analogue to the conditioned reflexes of the brain."

To build a machine that would reproduce all the behavior of a rat "would require a mechanism probably as large as the Capitol at Washington"-but it could be done!

For we're at the beginning of an amazing new technological age. Already there are many kinds of thinking machines in our incredibly mechanized world, helping to speed production, cut costs and build better products. And intimately a part of this whole story is the science of machine tool engineering. Today, Jones & Lamson engineers are working with the leading manufacturers in virtually every industry, helping them to plan production wow for the machines and the products of tomorrow.

They are at your service, too.

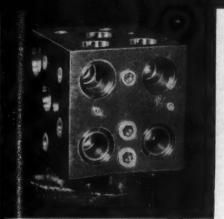
* In "The Advancing Front of Science" by George W. Gray, a memorable chapter on thinking machines reports this story in full



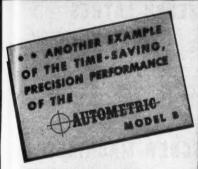
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Manufacturers of: Universal Turret Lathes . Fay Automatic Lathes . Automatic Double-End Milling and Centering Machines . Automatic Thread Grinders . Optical Comparaters - Automatic Opening Threading Dies and Chasers.

PRINGFIELD, VERMONT, U.S.A. Profit-producing Machine Tools



BORING & MULTIPLE DIAMETER HOLES - at one setting - with 30% SAVING IN TIME



(Photos and performance data courtesy of C. B. COTTRELL & SONS CO.)
Milwaukee, Wisconsin



Take a good look at the work-piece shown above — a centrifugally-cast steel unit requiring the precision boring of a total of 8 holes — 5 of them with multiple diameters and 3 holes (2 with 1½ inch diameters, 1 with 13½ inch diameter; 7½ inches long) which must be held to within .0002 on the diameter throughout the entire depth.

Sure, it's a tricky job but a "natural" for the Autometric Model B Precision Jig-Boring Machine. The piece was rough drilled before being brought to the Autometric where it was finish bored to specifications — at one setting — with a 30% saving in time over other methods.

Such fast, precision performance is possible on the Autometric Model B because it is the only jig-borer, with a built-in rotary table, capable of boring holes on all sides of a work-piece at one setting.

Write for complete information on the Autometric Model B Jig-Boring Machine.

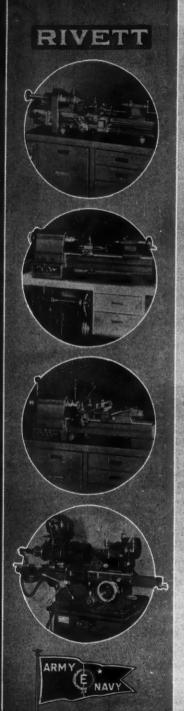
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idiary of Kearney & Trecker Corporation

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TOOL-ROOM LATHES

RIVETT 608 back-geared, screw cutting lathe is recognized the world over for its ability to produce fine work within guaranteed precision limits. In manufacturing, tool-making and experimental work, it will handle a great variety of parts in minimum time. Finely made attachments for milling, spiral cutting, slotting, relieving, toper turning, ball turning, grinding, forming and multiple operations are available. Swing is 8½" dia.; center distance is 18½", collet capacity is 1" max.

PLAIN BENCH LATHES

RIVETT plain precision bench lathes have vastly increased the earning power of such machines. An engineered unit, a Rivett lathe is quick to setup, has wide speed range, power and vibrationless performance and is capable of many jobs aften produced on heavy, and the many jobs aften produced on heavy, and many fine are turnished: Series 715 has 7" dia swing, 15" center distance and 4" max. collet capacity; Series 918 has 9" dia. swing, 18" center distance and 1" max. collet capacity.

HAND SCREW MACHINES

RIVETT 918 hand screw machine incorporates precision, balanced design and operating features to make it an efficient producer on small duplicate parts. Bar stock passed through spindle may be held in push-out collet, while work individually chucked may be held in draw-in collet, step chuck or Jaw chuck. In combination with six turret operations, double tool cross slide can be furnished for straight or taper turning, forming or cutting-off. Swing is 9"-dia. and collet capacity is 1" max.

INTERNAL GRINDERS

RIVETT internal grinders are primarily designed for tool room work, however, are used extensively in precision manufacturing. Available internal and external spindles in combination with many adjustments make possible a great variety of grinding operations. Two sizes are furnished: Series 104 has internal and external grinding capacity up to 3" dia. with power table travel up to 4"; Series 112 has internal and external grinding capacity up to 8" dia. with power table travel up to 6"

Write for General Bulletin 500

RIVETT LATHE & GRINDER INC.
BRIGHTON, BOSTON, MASS., U.S.A.

March



for HIGH SPEED PRODUCTION







Jarvis Flexible Shaft Machines

When used with correctly selected Jarvis Rotary Tools, these multiple-speed flexible shaft machines are the "power hands" of the metal working industry. They will perform many filing, grinding, sanding, buffing, brushing, cutting, and cleaning operations.

Jarvis Ground Rotary Files

The recognized standard in thousands of manufacturing plants for fast, efficient performance. Now furnished with Jarvis Hy-speed Case, increasing tool life an average of three times. Send your high-speed steel rotary files back to Jarvis for regrinding. They will be furnished with life prolonging Hy-speed Case.

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PERFECTIONISTS!



To increase production in the cutting of brass tubing.

The Circular Tool Co. recommended a saw designed to operate at 3,000 R.P.M. In this case it actually turned at 6,000 R.P.M. and stood up perfectly at this phenomenal speed. The resulting production was at the rate of over 2,000 pieces per hour. 50,000 pieces were cut before the saw required resharpening and 10 or 12 resharpenings were made before the saw became too small for this machine. Thus production per saw was between 500,000 and 600,000 pieces and tube cutting ceased to be a bottleneck.

This actual case history clearly illustrates the fact that Circular Tools are made by "Perfectionists" for exacting and special operations. Why not bring your metal cutting problems to their attention to-day?

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OPEN, CELLULAR WHEEL FOR FAST GRINDING

The "American" No. 15 Abrasive Content Wheel takes deeper cuts... faster... with good finish. Plants large and small report remarkable performance. One user states.—"Your new wheel takes .012" cut from hard chrome dies with no burning and only .001" wheel loss." Cool cutting and long lived, this "American" Grinding Wheel holds its corners well and is excellent for both surfacing jobs and sharpening milling cutters, hobs and form tools. The "Metal Eater" is not a premium priced wheel!

WRITE FOR FURTHER DETAILS.



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A HIGHLY DEVELOPED LINE...



MA 8—Eight speeds. 1200 to 12,000 R.P.M. Small work up to %". Built-in motor. Bench and column types. 1 to 6 spindles.



Type B—No. 1, No. 2, No. 3 sizes. Hand feed drilling units. Hand feed tapping units. Power feed drilling units.



ONLY years of steady development can evolve the drilling equipment that is found in the Avey Line of Sensitive Drilling Machines.

The advances required in mechining methods caused by the demands for greater output, necessitated more efficient drilling equipment. Avey Drilling Mechines have steedily led the field.

Avey High Speed Sensitive Drilling Machines are built-in types and sizes to cope with varied seeds. They are designed in capacities from the smallest drill gauge she to approximately 1½ luckes.

Soing ball boaring throughout, they rate the highest speeds without vibration. This feature insures maintained accuracy.

The Avey Catelog details the line of Avey Drilling Machines and Drilling Machine Accessories.

Avey Engineers will come to your aid in solving new and different drilling problems.

Individual Maters for each Spindle. Single and Multiple' Spindles.

AVEY
DRILLING MACHINE CO.
CINCINNATI OHIO



MA 6—Six speeds. No. 2 and No. 3 sizes. Built-in motors.



Belted quick speed change machine. No. 2 size. Four speeds. Standard frame motors.



22

POSTWAR PRODUCTION
WILL NECESSITATE

AUTOMATIC LOADING OF MANY PARTS

1. Loading chute in forward position placing rough work between centers. Chute then withdraws to clear tools.

2. Tool has completed cut, centers are about to withdraw allowing finished piece to drop into unloading chute.

3. View of complete machine.

● The illustrations on this page show one type of Automatic Loader developed by Seneca Falls' engineers for handling valve guides of varying length and diameter. It is installed on a Lo-swing IMP Automatic Lathe, having a built-in Quick Change-Over Mechanism which provides a simple means of changing carriage stroke for different length guides.

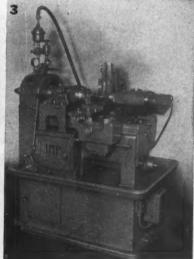
The operator merely starts the machine and keeps the loading chute filled. One operator can attend a battery of such lathes.

Seneca Falls' engineers have amassed a wealth of experience, not only in automatic turning; but in the synchronization of automatic work handling devices to highly productive Lo-swing Lathes. Perhaps this experience can be applied to your present or postwar problems.

SENECA FALLS MACHINE CO. Seneca Falls, New York







LATHE NEWS from SENECA FALLS

Four

TAKE HEAVY CUT AT HIGH SPEEDS

THAUS MANN HER. U.S. PAT- DES

HIGH SPEED STEEL

The combination of great toughness and a high degree of hardness live MO-MAX superior cutting quality. This makes possible heavy cuts and the use of high speeds in a wide range of cutting operations.

Many tool manufacturers have adopted MO-MAX as a standard high speed steel for their most important products. If you haven't already done so, it will pay you to investigate this steel which has revolutionized the high speed steel industry.

> For technical details and available stocks, conlact any of the steel procers listed below.

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Completely covers ap plication and use of MO MAX High Speed Steel Address The Cleveland Twist Drill Co., 1242 East 49th St., Cleveland 14 Ohio.

Revised technical data book almost ready.

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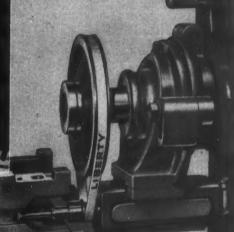
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ABOVE
No. 90-31 Vertical, sharpening
broach with 5° clearance.

AT RIGHT
No. 90-30 Horizontal, grinding a
difficult keyway in a hard-to-getat place.

Do Double Duty Surface Grinders

Liberty High Speed Grinding Attachments for surface grinders are precision tooled for greater accuracy on intricate and hard-to-get-at precision grinding jobs.

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Tomorrow's Tools for Today's Tasks

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Extraordinary resistance to "wear and tear" (whether from abrasion, corrosion, or heat) is the outstand mality of FIRTHITE Sintered Carbide. Its intense hardness, rigidity, and stability make it the BEST material

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THE HOW AND WHY OF

PROPER SELECTION AND USE OF LATHE DOGS . . . Data Sheet No. 23

Lathe Dogs provide the most common method of driving work mounted between centers. Two basic types are widely used: the Bent Tail Dog and the Clamp Dog. In Williams' line, the former type is supplied with straight or bent tail, and the Heavy Service sizes have two screws.



Safety and non-safety screws are now interchangeable in Williams'
"Vulcan" Dogs A and B. This type is available with either bent
or straight tail, and the Heavy Service sises have two screws.
Safety screws present less hazards to the operator.

In selecting a Lathe Dog for a given job, begin by choosing a Dog whose capacity approximately fits the work. Too large a dog sets so far off center on the face plate as to cause vibration and inaccurate results. Dog sizes are expressed in inch capacity, i.e., a 5" Bent Tail Dog will accommodate work up to 5" diameter.



Application of Bent Tail Lathe Dog.

WILLIAMS DROP-FORGED TOOLS

The next consideration is type of Dog. Bent Tail Doga are used for practically all types of round work. If work is of small diameter or such that the bending or twisting action of the bent tail is objectionable, the straight tail pattern should be substituted. A projecting stud on the face plate is used to drive this Dog. The Clamp Dog is used to drive rectangular, hex and other than round work.

While the single screw pattern of the Bent Tail Dog is the most widely used, Dogs having two screws provide a more positive grip and should be used when the cutting operation imposes a severe driving load.



Application of Clamp Lathe Dog.

Both Bent Tail and Clamp Dogs should be located on the headstock end of the work so that the tail projects over the end far enough to securely engage a slot in the face plate. After the work has been placed between centers and the tailstock spindle tightened, make sure that the tail of the Dog moves freely in the face plate slot. Any cramping or binding here may lift the work off the live center and cause it to run eccentrically.

Centers should be sufficiently tight on the work that a firm grip is needed to rotate the work slightly back and forth by hand. If the Lathe Dog tail makes a clanking noise against the face plate slot when machine is started, centers need further tightening.

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The grinders can be humahed a either bench as knowlypus, in several sous, for west or dry grinding Attachments for chip breaks, and

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THE RIGHT TOOL STEEL

for machining Monel, Nickel, Inconel

Tungsten high-speed tool steel (18-4-1 high-tungsten, low-vanadium type, with 0.70-0.75 per cent carbon content) is most satisfactory for general use in machining high-nickel materials.

Toughness, and ability to hold a cutting edge at moderately highmachining temperatures are characteristic of this tungsten steel.

It is easily formed into tools and is relatively insensitive to variation in heat treatment. The following procedure should be followed as closely as possible to obtain the necessary Rockwell "C" hardness of 63-66:

- (1) Anneal at 1650° F. and furnace cool.
- (2) Preheat slowly to about 1500°-1600° F.
- (3) Transfer to high-heat furnace, bring up quickly to 2350°—2400° F.

INCO NICKEL ALLOYS

MONEL - "K" MONEL - "S" MONEL - "R" MONEL - "KR" MONEL - INCONEL - "Z" NICKEL - MICKEL . Shoot .. Strip .. Rod

- (4) Quench in oil, or cool in dry gir blast.
- (5) Draw to 1050°-1080° F.

In machining high-nickel castings, many machinists prefer an 18-4-1 steel with cobalt and low molybdenum content.

To get the necessary Rockwell "C" hardness of 64-65:

- (1) Preheat slowly to about 1500° F.
- (2) Transfer to high-heat furnace and bring up quickly to 2425° F. Hold for a time, depending upon the size. Do not soak.
- (3) Cool in dry air blast.
- (4) Draw to 975° F.
- (5) Redraw to 650° F. (to toughen).

Tools cooled in an air blast must be ground deeply to remove the decarburized surface. For tools exposed to severe shock, a hardness of Rockwell "C" 60 is preferred.

Carbon tool steels are not satisfactory for machining high-nickel materials. Stellite, tungsten carbide and tantalum carbide are suggested for cutting hard "K" Monel (over 275 BHN) and cast "S" Monel where the nature of the work and the condition of the machine permit.

For further information about Tool Steels, and other machining problems, write for booklet, "T-12-Machining."

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> Please send me copies of the booklet, "T-12 - Machining."

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"But the big thing is LUBRIPLATE arrests progressive wear and prevents rust and corrosion. Sure you save on parts replacement and machine shutdowns... and as to lubrication ...LUBRIPLATE is the slipperiest stuff you can put on a bearing. Of course it saves on power. All and all LUBRI-PLATE is the most economical lubricant you can use."

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No. 3 - Ideal for general oil type lubrication. Ring oiled bearings, wick feeds, sight feeds and bottle oilers,

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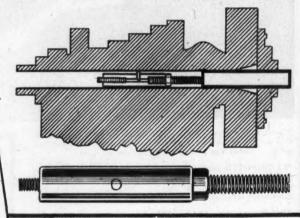
STEP-UP YOUR LATHE PRODUCTION WITH THE CARLSON Spindle LATHE STOP

The Carlson Spindle Lathe Stop is designed to speed up and simplify lathe operation, especially in machining parts on a mass production schedule. When placed at correct position in spindle for first part, it automatically provides permanent set-up for remaining parts to be machined to same dimensions, regardless of augntity. The Stop can be placed anywhere within the spindle. It is fitted with an adjustable screw which can be extended out in center of chuck jaws when chuck is needed for working on small parts.

- a SPEEDS OUTPUT
- **REDUCES REJECTS**
- . SAVES SET-UP TIME
- ASSURES ACCURACY
- · REQUIRES ONLY SEMI-SKILLED LABOR

EASILY ATTACHED

The Carlson Spindle Lathe Stop can be installed in a few minutes. When ordering, please mention make and model of lathe; also specify inside diameter of lathe spindle.



MODEL No. 101 - Inside diameter 34-inch fits South Bend, Logan, Atlas, Sheldon, and other make benchtype lathes. PRICES ON OTHER SIZES FURNISHED ON REQUEST

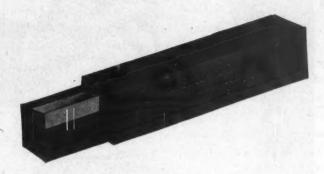
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CARBIDE TOOL CO.

60 Brookline Street
Cambridge, NF Mass



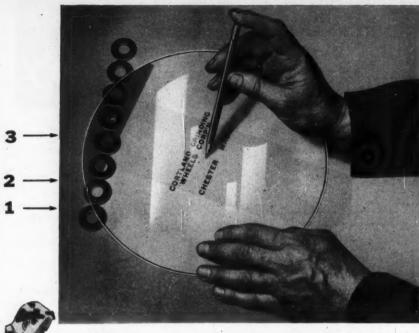
MAIL THE COUPON TODAY!

Please send me your new Standard tool folder and a Standard tool wall chart for our tool room.

NAME______TITLE____

COMPANY

II CON



He looked through and found the

He was a harassed manufacturer, in the midst of renegotiation. Not a particularly good time to call and try to talk about grinding wheels...

"Grinding Wheels? Hell — I need lapping compounds! Look at these specifications: S.A.E. 52100 — 63-65 Rockwell C scale — surface finish 2 micros — and production's gotta be stepped

up! . . . What's that thing?"

"Just a piece of clear plastic. It represents the segments in your vertical spindle grinders. Now imagine that these washers are the work on your tables. Would you mind rotating this disc counter-clockwise . . . slowly. . 1 See how the narrow end of the Cortland Segment starts to pass over the work? Shock and resistance minimized; large surface still exposed to coolant . . .

"Keep going. . 2 Watch the action of the straight inner edge of the segment — See how it travels diagonally over the work? We call it Diagonal Shearing — with varying contact it shaves off the metal . . .

"Keep going . 3 Now the segment is in full surface contact with the work. Maximum heat is generated, but only momentarily, because as the segment continues to pass across the work, more and more of the ground surface is again exposed to the action of the coolant.

"That's the success story of Cortland Chucks and Segments—Diagonal Shearing with varying contact—for better, faster cutting; minimum shock; maximum area exposed to coolant; and ground material swept aside. Better surface grinding, less segment wear, less power needed, lower overhead and maintenance ... All good answers, yes ...?"

this Disc Answer!*

3

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t



*...the Answer to a problem in Surface Grinding. The problem may involve a Profilometer reading of 2 microinches; or hardened steel parts that heat and squeal; or table loads that take too long to grind or require too much amperage, or need too many segment dressings....

You'll find these problems solved—and many more in the true case histories presented in the Cortland Chuck & Segment Bulletin. For a free copy write on your letterhead to Cortland Grinding Wheels Corporation, 10 Cortland St., Chester, Massachusetts.

CORTLAND
Chucks and Segments



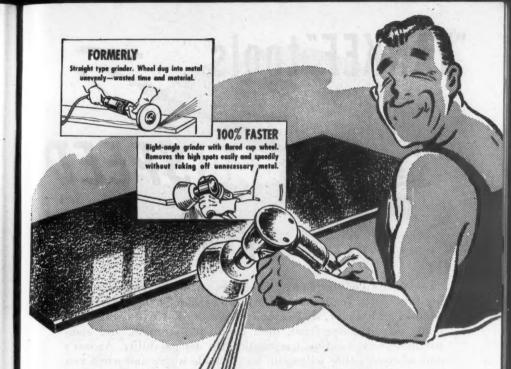
Bath Taps

If the work is "tough going" and you need a dependable tap --- put a Bath Tap on the job for satisfactory results.

Bath Taps are precision ground from hardened steel. They provide clean, accurate cuts at high speed.

Specify Bath Taps for long life and accuracy.

JOHN BATH & COMPANY, INC.



how we steered them to a 50% saving

THE sparks were flying but not fast enough, thought the Rotor Application Engineer who looked over this job in a fabricating shop. They were using straight type High-Cycle grinders with 8-inch wheels for grinding bevelled edges of plates. This type of wheel dug into metal unevenly—wasted time and material.

"The right tool for this job," said the R.A.E.,
"is a right-angle grinder with a 6-inch flared
cup wheel. This type removes the high spots
easily and speedily without taking off unneces-

sary metal." The change was made with these results:

- 1. 50% saving in grinding time (or 100% more production).
- 2. Smoother, more uniform bevels.
- 3. 40% longer wheel life.

We'd be glad to help you make sure you have the right Air or High-Cycle tools to get maximum production and minimum costs with available man-power. No obligation.

Yours for the right tool,

HIGH-CYCLE O'TOOL

AIR

ROTOR TOOL





"Yankee" Fine Mechanics' Tools are speeding and simplifying production for industry's task forces. Designed to save time, trouble, and money, their inbuilt ingenuity is lengthening manhours on the home front, their simplicity, strength, and compactness are upholding a reputation for dependability. At war's end, of course, they will again be available where and when you want to buy them. Meanwhile, the energy of all-out production is adding new chapters to our more than half-century's experience in fine tool-making. Treat your "Yankee" Tools right. They are weapons of war.

Order from your supply house, or write North Bros. Mfg. Co., Dept. MMS-344 Philadelphia, Pa. Furnish priority ratings whenever possible, and every effort will be made to fill your orders.

"YANKEE" SPIRAL SCREW DRIVER NO. 130A
A Size for Every Purpose

"YANKEE" TOOLS

Make good mechanics better

North Bros. Mfg. Co., Phila. 33, U. S. A.

Established 1880



That's why time out for replacing and resharpening is reduced when you use Morse Tools.

TOOLS ARE WEAPONS --- TREAT 'EM RIGHT!



TWIST DRILL AND
MACHINE COMPANY
HEW BEDFORD, MASS., U.S.A.

NEW YORK STORE: 130 LAFAYETTE ST. - - - CHICAGO STORE: 570 WEST RANDOLPH ST.

AND MORE JOBS AND MORE OPERATIONS IN FEWER SETTINGS



Rotary Table Used in Combination with G. & L. Continuous Feed Facing and Boring Head Increases Flexibility

The use of rotary tables on Horizontal Boring Mills, whether built-in or furnished as an extra, makes it possible to reduce the number of settings on the workpiece. A four-sided piece can be machined by indexing 4 times, a six-sided piece by indexing 6 times, etc.

The G. & L. Continuous Feed Facing and Boring Head makes it possible to include operations such as turning flanges and boring and facing simultaneously.





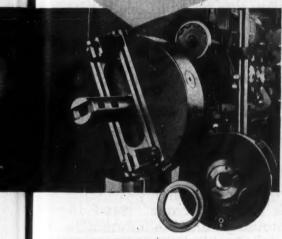
Perhaps you are losing time by not using a combination of both on your horizontal boring mill. Our engineers will be glad to analyze your work to see if such a combination would be a practical solution to your problem. Call on them without obligation.

GIDDINGS & LEWIS

144 DOTY STREET

Continuous Feed Facing and Boring Head

This outstanding attachment permits facing and boring operations aimultaneously and many other combinations of operations not ordinarily performed with the horizontal boring, drilling and milling machine. It is provided with a tool slide having six separate power feeds,



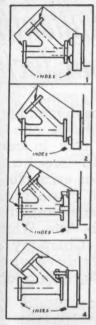
Rotary Tables . . .

G. & L. Rotary Tables are available from the simple, plain 24-inch diameter rotary table with ½° graduations up to the largest completely self-contained units weighing 55,000 lbs. with a rated capacity for parts weighing up to 25 tons.

A Typical Job Solution

Jobs of this type can be done in a hurry with the G. & L. Continuous Feed Facing and Boring Head in conjunction with a G. & L. Rotary Indexing Table. This fitting, for instance, can be completely machined in one setting.

PLAN VIEW



Operation 1

Rough face flange using two tool bits. Index and perform same operation on other two faces.

Operation 2

Finish face flange using single point tool. Index and perform same operation on other two faces.

Operation 3

Turn O. D. of flange and bore simultaneously. Index and perform same operation on other two faces.

Operation 4

Back face flange using single point tool in telescopic tool holder. Index and perform same operations on other two faces. Unload.

(Right) Precision rotary table with power feeds and rapid traverse.



(Left) Precision rotary table with power feeds.

Additional Data is contained in this folder. When making inquiry, please indicate your business connection and type and size of machine used. Ask for Bulletin No. MM-34.

MACHINE TOOL COMPANY

FOND DU LAC, WIS.

One-Half Millionth of an Inch

War has demanded finish down to one-half micro-inch. In certain torpedo mechanism parts, for example, this degree of perfection must be obtained. For this job, The White & Bagley Company successfully developed a special grinding job.



For more than half a century The White & Bagley Company has been pioneering and developing oils and lubricants for every industrial metal-working need - special oils for special grinding oil.



Yours for the asking.

New book—"Economy Grinding Oils and Lubricants" 1944-F-16. containing valuable information on speed and precision in grinding made possible through the use of ECONOMY GRINDING OILS and LUBRICANTS which have set new production records in thousands of plants. Write for it on your letter head.

HEWHITE & BAGLEY COMPANY Chicago Detroit Minneapolis



PRECISION plus HIGH PRODUCTION on Small Parts

ON EVEN COMPLEX PARTS like this at right... HIGH PRODUCTION... FINE FINISH... HIGH PRECISION... Tolerances within ±.0005" on all dimensions are obtained on the Gorton 16-A Precision Automatic Screw Machine using single-point, low cost tools.

Each part is completed within the close limits specified in only

This precision performance on long production runs is made possible by the rigid construction of the Gorton 16-A, one of the heaviest Swiss-type screw machines built.

Wide Range of Work

The Gorton 16-A produces an almost endless variety of short or long, slender parts — diameters .005" so 7/16", lengths 1/32" so 21/4"—complete in one operation.

It does step turning, generates curves, tapers, back recesses, knurls, chamfers, etc. It centers, drills, slots, threads or taps.

Tool slides are easily accessible. Micrometer adjustments for all tools insure accurate, quick setups at low cost. Centralized fingering controls provide infinitely variable spindle speed (1 100 to 10,000 R.P.M.) and infinitely variable cam feeds (20 to 720 pieces per bour; 20 to 1440-optional). No speed or feed gears to change.

GORTON Complete Cam and Tool Service

For Any Make Swiss-Type Screw Machine - Borton or Oth For Any Make Swiss-Type Server Mackine — Gerten ser Others Gorson exclusively offers a complete cam and tool service. Highly skilled engineers are available to take care of all your needs. This service consists of a detailed cam and tool layout, listing all operations of the machining cycle together with necessary cams, tools, collets and bushings. This service is available at the Gorson factory at Racine, Wis, for the Midwest and Pacific areas; and from Russell, Holbrook, and Henderson (our Eastern Distributors) of New York City for quick service in the East.

ON ALL DIMENSIONS



THIS PART COMPLETED in One Operation

IN LESS THAN 9 SECONDS

Tooling: Five flat cams, one bell cam, five cutting tools, one drill, two collets, one bushing.

OPERATIONS

- 1-Center for #49 drill.
- 2-Turn .103" dia. and form 54° angle. Drill #49 dia. hole .281" deep.
- 3-Form .075" dia. groove.
- 4-Form 25° angle and turn .062" dia. 8-Form .031" radius and cut off fin-
- ished part. Meterials .125" Round Free Cutting

Productions 7 pieces per minute.

GEORGE GORTON MACHINE CO. 1318 Racine St., Racine, Wis.

Send me, without obligation, FREE bulletin with complete information covering the Gorton 16-A Precision Automatic Screw Machine.

Company.....







ON MACHINE CO.

Proof of a

Surface Analyzer Tapes Show You Get A Better Finish With Chicago Wheels

These results were obtained at a rate of 10 pieces per hour in an aircraft parts plant. Material, X-13-15, Rockwell 60 to 57, grinds out .006 to .007 stock. Chicago Wheel used, ½ x ½ x ½", Grain 180, Grade L Arcite. Spindle Speed 40,000 r.p.m. Lapping and super finishing eliminated on this job.

Can you match that finish? Sounds phenomenal, but you can do the same thing with Chicago Wheels.

Squint your eye along the surface, test it by "feel" or be scientific and use a surface analyzer to measure your finish in micro inches—you'll find that Chicago Wheels give you better finishes, hold closer tolerances and have longer life. They're mighty fast, too; are often spoken of as "bottleneck busters."

One of the secrets behind Chicago Wheels' superiority is the exclusive bond formula developed, as a result of 50 years' experience making grinding wheels.

CHICAGO WHEEL & MFG. CO.

America's Headquarters for Mounted Wheels and Small Grinding Wheels

1101 W. Monroe St.

Dept. MM

Chicago 7, Ill.



Better Finish

Now Featuring Wheels Up to 3" in Diameter

For the duration, with full WPB approval, we are specializing on the small sizes — anything up to 3" in diameter.

Write for Catalog and we will include Engineering Survey Forms helpful in getting the right solution to your own grinding problems.

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MM-3
Send Catalog and Survey Forms. Interested in

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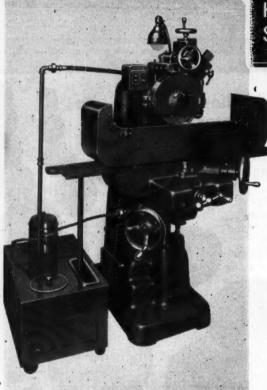
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Now You Can Get QUICK DELIVERY

on COVEL No. 15 H A N D F E E D SURFACE GRINDERS



To meet demands, production of Covel No. 15 (6" x 18") Hand Feed Surface Grinders has constantly been stepped up. War industries can now get delivery within a few short weeks. . . . The great popularity of No. 15 results from its outstanding highproduction features-operating ease, quick set-up, clearly graduated convenient controls, clear visibility, rugged dependability and many others which are fully described in Covel's Bulletin MM-34. Write, wire or phone today for your copy and name of nearest dealer.



Shorten Employee Training Time with Covel Equipment.

GRINDING MACHINERY SIND

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COVEL MFG. CO., BENTON HARBOR, MICHIGAN U

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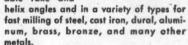
CARBIDE-TIPPED

Cal-Cutters

make the difference!

THERE'S nothing extra to buy—no special skills required—when you put the new Cal-Cutters on the job! But these husky carbide tipped tools enable you to get more work out of your milling machine by using higher speeds and feeds than possible with high speed steel cutting tools. These long-lived Cutters reduce downtime for re-sharpening, too, provide better surface finishes, cut cost-per-piece to the core.





The new Cal-Cutter Catalog M-1 describes, illustrates and gives specifications on the latest Cal-Cutter types for a complete range of milling requirements. Write for your free copy today!















MACHINERY MANUFACTURING COMPANY

Vernon Line of HORIZONTAL MILLS, VERTICAL MILLS and JIE BORERS, SHAPERS and GRINDERS

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tions require back spot-facing, back counter-boring or back finishing of previously drilled holes, this "Buffalo"-developed tool can save important time, do a cleaner job than with manual methods. Convenient foot feed actuates motor "plugging" control. When foot pedal is released, spindle stops. Large area working table. Efficient coolant system. The design of the "Buffalo" machine permits the use of several types of operating switches. Details in Bulletin F-3322, sent on request.



BUFFALO FORGE COMPANY

388 Broadway

Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

Bufalo

BACK SPOT-FACING

MODERN MACHINE SHOP

March, 1944

릮길 TOOSE SHAPERS AIN TYPE

PLAIN TYPE-A fast utility muchine for a wide variety of the average shop work and for training purposes in industrial schools. Fine for accuracy on small jobs, such as machining parallels, small fixtures, vee blocks, dovetail slides, racks, small spur gears and keyscating small shafts.

PRODUCTION TYPE

PRODUCTION TYPE - Massively constructed with a large table to handle medium heavy work. Large cumbersome pieces may be easily clamped directly to the apron by removing the table. Power rapid traverse and power down feed accelerate production and reduce operator's fatigue.

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UNIVERSAL TYPE

UNIVERSAL TYPE - Ideal for tool and die work, experimental laboratories and model shops or where angular work set-ups are required. Particularly adaptable for shaping wedges, gibs, internal openings, complicated fixtures, molding dies, etc.

IN 16", 20" and 24" SIZES "Lubrigard" Safety Device Increases

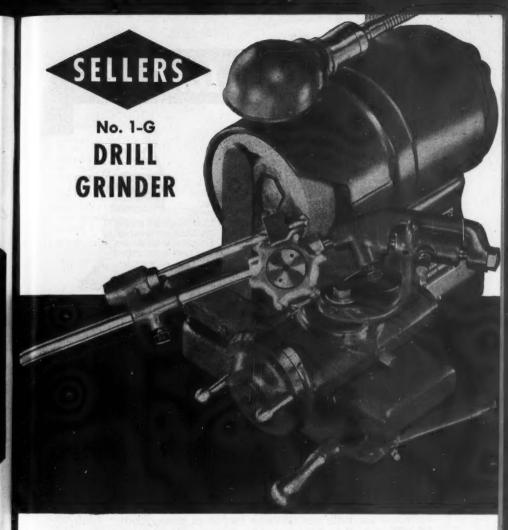
Immediate Deliveries on Firm Orders! Write for illustrated bulletin GC-12M

IEERING & MFG. CO.

LOUIS 4, MISSOURI

Manufacturers of Precision Equipment





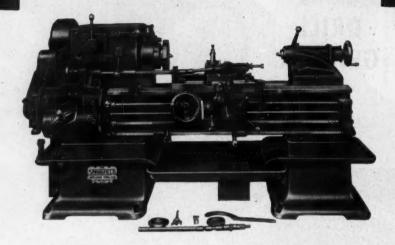
Every SELLERS Drill Point is Scientifically Correct

And it takes but a few hours for a green-horn to become an expert on this modern machine shop tool. Once set for the angle and clearance you require, it automatically produces a steady flow of perfectly pointed drills—each exactly like the

other. Speeds drilling time: reduces drilling costs: reclaims broken drills. Type 1-G takes drills from .028" (#70) up to ½" dia. Other models have capacities up to 3" dia. Write today for complete data and prices.

WM. SELLERS & COMPANY . 1614 Hamilton St., Philadelphia

PRECISION and LONG LIFE



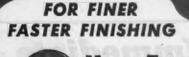
SPRINGFIELD Precision LATHES fill the munitions makers' demands for (1) extreme accuracy and (2) maintenance of this accuracy and long life.

Here are some of the factors that account for the sustaining of the original accuracy built into each Springfield Lathe:

HEADSTOCK...12 speeds...only half of the easy-shifting spur gears mesh at one time. APRON...extra heavy... operates on ball and bronze bearings throughout. TAIL-STOCK...all bearings and bed ways oiled from one well.

The SPRINGFIELD LATHE is an outstanding value for both tool room and quantity production use. Write for Bulletin 162.

THE SPRINGFIELD MACHINE TOOL CO.



Use OREME

Moto-Tools

Model 2 Moto-Tool, complete with accessories, as illustrated, in felt-lined hardwood case— \$23.50. Model 2 Mata-Tool only, with emery wheel point — \$16.50.

27,000 R.P.M.

Used in machine shops and tool rooms for the ching intricate dies. Used on production lines to deen coefficies, technique and tergings, company tools and do bundreds of princing vinhing, polishing, burring, routing and etching coefficients.

Demait meto-took has At-U. metor with cock-proof saledito housing, oil-accided (aither) bearings, and built is cooling fan. Walest only 10 owners—a fight and compact a girl tan handle it with cost. Dynamically balanced armature distinction with case. Dynamically balanced armature distinction with case. I be a second to the control. Main Tool's high speed 127,000 rpm. permits finer, faster work—tenserves turiers.

Bremel Meta-Tools are proving indispensatic aids in speeding up was production in such



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10 DAY TRIAL

Try e. re- ad pro- and in the interest of the

Whether you have a klute-Tool or any other 1750 of the color only ganuine Dremol shop-fasted Accessors - First

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DREMEL MFG. CO. T-224 C RACINE, WIS.U.S.A.

Immediate Shipment STEEL BOXES

FOR YOUR PRODUCTION NEEDS



STYLE 300 STACKING BOX

Just right for your small parts. Light in weight, easy to handle. Equipped with drop handles each end. Runners save wear on bottom of box and act as positive stacking lock.

No. 303-9"x131/2"x41/2" 19 ga., .75 Each



STYLE 700 STACKING BOX

A light weight box designed for quick identification of contents. Will stack with No. 303. Finished olive green enamel, baked on.

No. 703-06-9"x131/2"x41/2"-19 ga., \$.95 Each



STYLE 600 STACKING BOX

An ideal all-purpose shop box. Sturdy all-welded construction. Heavy skids act as positive stacking lock and reinforce box at point of maximum wear.

No. 601-10"x16"x6" 18 ga., \$.95 Each



STYLE 500 STACKING BOX

Open front makes contents easily accessible when boxes are stacked. Will stack with Style 600 boxes.

No. 501-10"x16"x6" 18 ga., \$1.15 Each

Prices F.O.B. Factory, Philadelphia. Any Quantity.

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The Very LATEST In Shaper Design and Efficiency!

Dept. MM.

This new Queen City Shaper is a heavy, rugged machine affording greater ease and convenience of operation, equally suited for both the daily grind of heavy production and general tool room work.

The ram is of the V-type of wide bearing, both bottom and sides. The clutch is the dry multiple-disc type, requiring minimum attention and adjustment. The feed range is extremely versatile—from .008" to .191". Changes of feed are quickly, easily accomplished. A high torque motor for the power rapid traverse is standard equipment, with many unusual features. An electrical limit switch is incorporated into the rail, offering complete motor control. Timken Bearings are used throughout.

For top performance, speed, versatility,

QUEEN CITY

AGENTS IN PRINCIPAL CITIES

accurate workmanship, and unusual economy both in first cost and upkeep, the

Queen City "SUPER TWENTY" Shaper

For full details regarding features and specifications of this new Shaper, write

will meet with your entire satisfaction.

MACHINE TOOL CO.

217 E. SECOND ST.

CINCINNATI 2, OHIO

March, 1944

MODERN MACHINE SHOP

57

"Sure from "

/ was from "

Missouri

If you, too, are from Missouri, here's the wheel for you! And, don't be satisfied with just better than your usual performance. We urge you to be brutally skeptical and critical. Try this wheel as you've never tried any others! Give it the works! Send for the Por-os-way booklet "Facts About Por-os-way", with the "prescription blank." Order a trial lot! Then make your toughest test yourself!



CHIP CLEARANCE DOES IT!

Grinding wheels, like lathe tools, need clearance. The Por-os-way wheel provides chip clearance, NATURALLY.

THIS MAKES THE DIFFERENCE

You can easily spot the difference between an ordinary wheel (top) and a Por-osway wheel (bottom). Por-osway's extra porosity gives you more than 8 distinct operating advantages.



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A. P. DESANNO & SON, INC.

440 Wheatland St., Phoenixville, Pa., Since 1893 New York • Pittsburgh • Cleveland • Detroit

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Radiac POR-OS-WAY - Radiac PARAFLEX - Radiac Mounted
Points and Mounted Wheels - Radiac Internal Grinding Wheels
Radiac Abrasive Cut-Off Machines and Discs

Por os way often enables you to rough grime with the same one grain wheel you select for precision finishing.

2-IN- I WHEEL

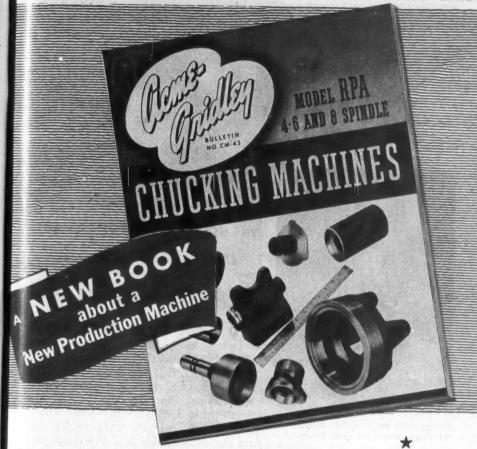
Por-os-way Users List Reads Like a Blue Book of American Industry. A few are:

E. C. Atkins & Co. - Bell Aircreft - Edward G. Budd Mfg. Co. - Buick Moter Division of General Motors - Kinner Motors, Inc. Studebaker Corporation - Thompson Aircreft Products - Wadell Engineering Co. Westinghouse Electric-Wright Aeronautical

AND

THIS MONTH'S "BEST SELLER" ON THE PRODUCTION LINE

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Production men who have chucking work to do can't afford to be without this book—write for Bulletin CM-43, on your letterhead.

New Acme-Gridley Chuckers—4, 6 and 8-spindle are engineered for new production and accuracy—to produce more at lower costs.

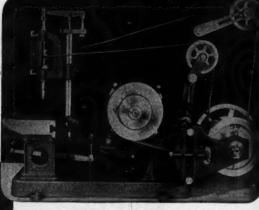
WENATIONAL ACME ...

ACME GRIDLEY 4 G AND 8 SPINDLE BAR AND CHUCKING AUTOMATICS - SINGLE SPINDLE AUTOMATICS - AUTOMATIC THREADING DIES AND TAPS - THE CHRONOLOG - LIMIT AND CONTROL STATION SWITCHES - SOLENDIDS - CENTRIFUGES - CONTRACT MANUFACTURING Speeds from 3,000 to 23,000 R.P.M. Available with one, two, three or four spindles.



Please send me complete details on the Super Sensitive Drill Press.

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JUST RIGHT FOR THE Supersensitive

L&D HIGH SPEED DRILL PRESS

Take the tiniest drill you can find and try it on the L & D Super Sensitive Drill Press. You will find this combination ideal. Why? Because the L & D has speeds up to 23,000 R.P.M.—speeds that make those hair-like drills really cut. And the chances for drill breakage are minimized, because the L & D has a fingertip control that even gives green operators the "feel" of the cutting action. It all adds up to precision production at surprisingly low cost. Send the coupon for details.

EDWARD BLAKE COMPANY

M.M.S.

634 COMMONWEALTH AVE., NEWTON CENTRE 59, MASS.

BLAKE TAP GRINDERS—FILTAIRE PORTABLE DUST COLLECTORS—AMERICAN TOOL HOLDERS—BLACK DIAMOND PRECISION DRILL GRINDERS—L & D HIGH SPEED DRILL PRESSES—WALTHAM CUTTER SHARPENERS

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with the MOORE JIC BORER

The deadly accuracy of our most powerful weapons starts with accuracy in the machining of their smallest parts. Eleven Moore Jig Borers operated by women at the Arma Corporation speed the production of high-precision instruments for the United States Navy.

or the complex equipment of war—and the amazing age of mass production to follow—tolerances thought impossible to attain a few years ago are today routine requirements. The Moore Precision Jig Borer answers the increasing demands for greater accuracy and speed in boring holes for jigs, fixtures, dies, gauges and special machine parts—and yet is so simple to operate that women quickly become proficient at it. I Moore-produced micrometer screws, ground to an accuracy never achieved before, give the Coordinate Location Method—an outstanding feature of the Moore Jig Borer—definite advantages over the graduated scale and size block methods of measurement. Inaccuracies between any two points, with the long screw, will not exceed .0002" and with the short screw .0001". The Moore Jig Borer is guaranteed to space and bore holes accurately within limits of .00025" in any position of the table. \P The range, sensitivity and rigidity of the spindle are evidenced in its ability to drill holes of 1/32" or less and yet to take a $\frac{1}{4}$ " cut accurately in increasing a hole from 2" to 21/2" in one cut under power feed.



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PARTNERS IN PRODUCTION—The Moore Jig Borer and the Moore Jig Grinder, each outstanding in its own specialty, together form a modern toolroom partnership to save production time and increase die life. The Jig Grinder tinish-grinds holes to size and location on both hard and soft work within .0001". Write today for descriptive literature on how these two machines will modernize your toolroom production.

MOORE SPECIAL



TOOL COMPANY INC.

740 UNION AVENUE, BRIDGEPORT 7, CONN.

ACCURATE REPRODUCTION





Trade marks . . . trade names . . . special letter-ing or designs . . . accurately reproduced in Matthews dies and stamps . . for marking all types of industrial products. Stamps and dies furnished for hand stamping, or for use in presses or marking machines.

*REG. U.S. PAT. OFF. Write for Catalogs 146-A and 146-B



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Branch Plants. New York, Boston, Chicago, Philadelphia, Newark, Syracuse

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Rubber has revolutionized DE-BURRING . FINISHING POLISHING BRIGHTBOY is a combination of abrasive and a soft rubber binder. The abrasive is impregnated evenly through the rubber-de-burrs and finishes while the rubber cleans and polishes—all in one operation. The resiliency of the rubber cushions the abrasive action-eliminates operations between a grind and a buff -frequently serves as the final polish. Made in wheels and rods, and in blocks for manual operations. Ask your dealer or write us for catalogs and Methods and Applications booklet. Brightboy field representatives are at your service. BRIGHTBOY INDUSTRIAL DIVISION WELDON ROBERTS RUBBER CO. Newark, N. J.



FOR DRILLING or TAPPING

simple parts . . . or complicated ones like this





Ettco-Emrick





Typical Etico-Emrick Head for tapping 6 holes simultaneously. Quill clamp supplied with each Head, assures the rigidity needed for high precision work. Same gear case assembly can be used for drilling the holes.

It will do this because the first thing Ettco-Emrick engineers do when they get your drawing or sample of a part, is to figure out the handling and feeding method that lets you drill or tap all required holes simultaneously in one or more of the parts.

Then the Ettco-Emrick High Speed Multiple Spindle Head needed to carry out the method is made up entirely of standard stock parts.

Finally, a drawing is made of the fixture you need to set up and feed the parts for the drilling or tapping. This drawing goes to you with the Head, or we will build the fixture to order.

Get full details of this system that has solved scores of drilling and tapping problems for many manufacturers. Write today for **BULLETIN No. 3**.

ETTCO TOOL CO.

598 Johnson Ave., Brooklyn 6, N. Y.

Detroit

Chicago

How to Put Your Grinders "in the Pink"

Here's what the new blue flash trademark on Bay State grinding wheels means-

Fast. Only Bay State offers fractional grades-three degrees of hardness in a single grade. No more trouble due to a wheel being a trifle too hard or a trifle too soft. You can match the job requirements exactly - to get FASTER production.

Cool. Bay State's own development in bonding - H9 vitrified (recommended for most surface and centerless grinding) - has extra strength, so less is needed to hold the abrasive grains. Wheels can be more porous, COOLER-cutting.

Bay State also ofters a stronger guarantee of the same results every time. Fractional grading plus controlled perosity (8 degrees)

permit very close duplication once a satisfactory wheel has been selected.

Bay State leadership in quality has been mounting during the war Its acknowledged reputation for the finest honing and superfinishing stones, has extended rapidly into all the lines represented in the drawings below And Bay State engineering offers specialized services to help you determine the exact wheel for your needs.

Make a test to determine if fractional grading plus other Bay State advantages won't give you better results. The first step is writing us for Bulletin A.

BAY STATE ABRASIVE PRODUCTS CO. WESTBORG, MASS.



GRINDING WHEELS and COOK



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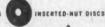
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CUT-OFF WHEELS













HANNA Control VALVES Help Speed Shell Production by Reducing Fatigue





SEND FOR NEW BULLETIN By an easy, fatigueless flick of the Hanna Control Valve on this National Welder, the operator welds a thin steel disc to the base of a 75-millimeter shell.

Hanna Unitite Control Valves are quick, positive acting, giving long life at minimum maintenance. Designed so that disc and seat wear uniformly across their full diameter, perfect surfaces are maintained and permanent tightness is assured.

Hanna Unitite Valves may be used with air, oil or water, as straight-way, 3 or 4-way valves, at pressures up to 250 lbs. They are available in 3 mounting styles...Send for full data.

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NEARLY 3000 NICHOLS MILLERS IN SERVICE

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This outstanding record results from uncompromising quality and correct design.

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explain why the NICHOLS Miller is a recognized leader for Production, Toolmaking, or Laboratory.

Investigate the multitude of unusual operations illustrated in the new 86 page Nichols Handbook. A helpful guide covering Milling—Profiling—Boring—Facing and Grinding. Ask for a free copy!

RANGE:

Longitudinal—10" or 19" Transverse—7" Vertical-Knee—13½" Spindle Rise and Fall—4½"

Standard Speeds to 2400 rpm Special Speeds to 5000 rpm

Immediate Delivery

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NICHOLS MORRIS CORPORATION

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For your special cutting tool orders we have modern equipment, skilled workers and the "Know How" to insure accuracy and fine workmanship. At present we can offer attractive deliveries for all types of cutting tools.

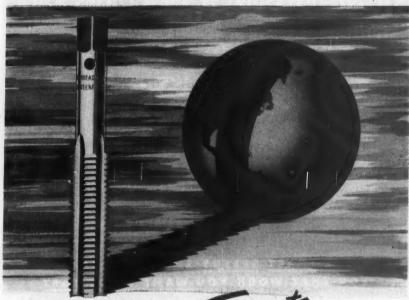
Send your inquiries for special cutting tools to A. C. E. Bulletin on request.

AMERICAN CUTTER & ENGINEERING CORP., 31743 Mound Road, Warren, Mich.

AMERICAN CUTTER

AND ENGINEERING CORP., WARREN, MICH.

SPECIALIZING IN HIGH SPEED EUTTING TOOKS TO YOUR PRINTS



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CAST THEIR SHADOWS BEFORE!

ALREADY the outlines of a great and prosperous future are taking form in the minds and plans of American industry. At hand are new and better tools, created to meet the exacting demands of war production, ready to be converted to peace. A bright star has risen on the small tool horizon during the war . . . a better, more accurate, longer lived threading tool . . . the Threadwell Tap. In months to come it will help many of America's leading industries make a better product at less cost.

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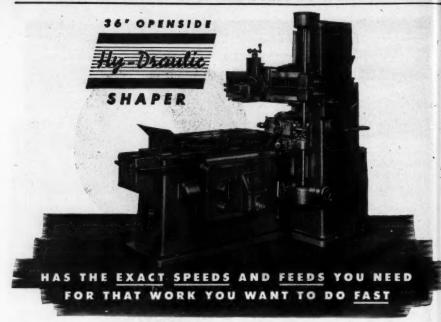


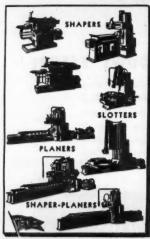
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● The 36" Openside Hy-Draulic Shaper has many unusual advantages. Its hydraulic drives give unlimited numbers of cutting speeds and feeds in-specified ranges. Operators quickly get the exact combination of speed and feed for maximum production on each job. It is so simple and easy! Almost anybody . . . including blondes, brunettes, and redheads . . . can produce a whale of a lot of work with the 36". Hy-Draulic Shaper and finish every shift feeling fine.

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March, 1944

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MODERN MACHINE SHOP

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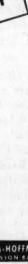
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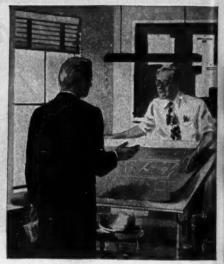


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Let our engineers work with YOU.





* They're out on America's "production fronts," giving freely of their highly specialized experience, assisting manufacturers of armament, equipment, munitions and supplies in keeping production lines moving. They're aiding MACHINE BUILDERS to apply anti-friction bearings more economically and efficiently. They're helping MACHINE USERS to get the most from the bearings they have-to lengthen their life-to reduce shut-down hazards. At our factory, The Engineering and Research Departments are equally busy, solving problems in bearing application, operation and maintenance submitted by buyers of bearings in every field. And all this service is being rendered without cost, THAT AMERICA MAY PRODUCE MORE.

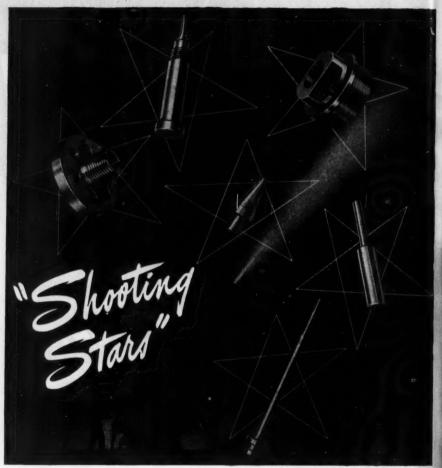
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BROWN & SHARPE TOOLS

1944



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These "shooting stars" are a few of the parts from a variety of guns—formed, hardened and ground in great volume by the craftsmen of Allied Products Corporation who use specialized equipment perfected over the years. The value of our specialized experience, on this and other wartime

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"II'S AN ALLIED PRODUCT!"... Allied Products Corporation and its divisions, Richard Brothers and Victor-Peninsular, in Detroit and Hillsdale, Michigan, also make: The original, patented R-B Interchangeable Punch and Die; sheet metal dies; plastic molds; jigs and fixtures; cold forged parts; and other specialized products.

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LOOKING FOR STEEL?

A call to us may solve your problem. Our job is to keep war production moving, so if you need steel, we'll get it to you in a hurry, if at all possible—subject, of course, to priority regulations. We will appreciate receiving your inquiries—phone, write or wire our nearest warehouse. You'll get prompt, courteous attention.



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NATIONAL EMERGENCY ALLOY STEELS We have been able to help out many customers with these new wartime steels. If you have any problems, we'll gladly assist you in determining the grades best suited to your needs.

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AIRCRAFT STEELS

These steels are for use in airplanes, and are available at our Chicago Warehouse only—which has been designated by the WPB as a warehouse to distribute them:

WD-X-4130 SHEETS

Open Hearth, Pickled and Oiled to Spee. AN-QQ-S-685. All gauges.016 to.50, sheets 18 x 72".

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Spec. AN-QQ-S-771

Write, phone or wire, if you are eligible for these steels.

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UNITED STATES STEEL

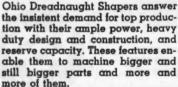


Orders for this machine are being shipped promptly.

UNUSUALI

This 36" Ohio Super-Dreadnaught Shaper is suited particularly to troublesome, large, odd-sized jobs. Table, 30" x 48". Ram bearing in column, 56" x 15". Length of ram without head, 80". Long ram allows 36" of stroke at any position on table or if job projects beyond front of table. Maximum distance from drop table (when furnished) to ram, 30". Weight of standard machine, 13,400 lbs. Complete range of standard accessories available, especially attachments for railroad work.

Ask for Bulletin 59.



One-position control makes the machine "easy on the man." Inbuilt

rigidity promotes last, accurate work. Convenience and flexibility heighten production. Many accessories and attachments are available to meet your individual requirements.

Orders for Ohio Dreadnaught Shapers are now being filled with reasonable promptness. Better indicate your needs at once.

THE OHIO MACHINE TOOL COMPANY . KENTON, OHIO



WITH WOrthern HIGH-LIFT LOW HEADROOM ELECTRIC HOISTS

LOOK WHERE THE HOOK GOE

The high hook lift-low headroom feature of Northern Electric Hoists will add 12" to 36" to the working height of your building—without extra expense—without altering the building. This means better use of storage space, easier handling of bulky loads, faster operation because clearances are greater.

Northern Hoists are also superior in strength, lifting power, speed, and handling.

Write for Booklet No. 26



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Northern Crane & Hoist Works Limited, Windsor, Canada

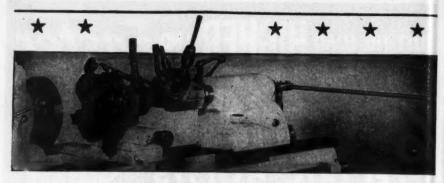


Photo above shows Jefferson Turrets on 16" lathe



71/2" Swivel Base Dividing Hond-

In Stock — Immediate Delivery — No Priority Required

Convert YOUR ENGINE Stock Turret LATHE INTO A TURRET LATHE

IN 15 SECONDS

Yes, it's as easy as that!
You simply attach the Jefferson Tail-Stock Turret, the Jefferson Tool-Post
Turret, and the Jefferson Adjustable Pull Feed
to your lathes as shown in illustration.



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6" Tilting Dividing Head with 3 Indexing Plates and Talistock— Immediate Delivery.

Some territories still open for dealers and salesmen.

With these three JEFFERSON time-With these three JEFFERSON time-saving devices attached to a lethe, any kind of work may be done, such as ferming, roughing, boring, finishing, knurling, drilling, tep-ping, etc., without stopping the lathe, or changing tools. THE JEFFERSON TURRETS are made very substantial, rigid, accurate and in several sizes to fit small bench lathes up to 24" swing.



4-Tool

Jefferson Turrets are real production tools—substantial, rigid, accurate and adaptable to any size or make of engine lathes. They must not be confused with the small makeshift gadgets now on the market.

TURRET DELIVERIES IN 6 DAYS

MACHINE TOOL 750 W. Fourth St., Cincinnati, Ohio

Tool Post Turrets, Tail Stock Turrets, Adjustable Pull Feeds, Belt Sanders, Gyratory Foundry Riddles, Overhead Swing Frame Grinders, Milling Machines, Dividing Heads and Vises.

PRECISION TOOL AND CUTTER GRINDING

The "Oliver Way



The cut illustrates the Oliver Ace Tool and Cutter Grinder as regularly supplied for sharpening the General Run of Milling cutters.

The machine as illustrated is equipped with centers for grinding Hobs, Reamers, Taper Reamers, Staggered tooth cutters, etc. Equipment includes an Adjustable Timken Bearing Head with Taper for Mounting End Mills and similar cutters with sharks.

Note the Simplicity of Setup, the ease with which angles are obtained and the possibilities for Rapid Production of individual cutters or quantities of similar cutters.



This is the machine you have heard about; the machine That cutter Manufacturers are using in quantity to Break the Bottle Neck in the production of Milling cutters.

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PROMPT SHIPMENTS NOW ON BOTH TYPES

The self-aligning feature of Alco Die Holders is pointing the way for wise manufacturers to cut costs by reducing set-up time. Only three things to do . . . tighten die in die cap . . . run die slowly on work for correct alignment . . . tighten two studs in the flange and start production.

And don't overlook the lowly bytton die . . . it's simple but efficient when used in the Alco Button Die Holder.

ALCCTOOLS

THE ALCO TOOL CO. 152 BIRDSEYE ST. BRIDGEPORT, CONN.

Detroit: 908 Stephenson Bidg. Chicago: 6219 S. Kenwood Ave., Hyde Park 6807

MODERN MACHINE SHOP

March, 1944

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PRECISION CENTERED EYE ENDING

A Centered EYE in 1 Operation

The DI-ACRO Bender makes perfectly centered eyes from rod or strip stock at the rate of up to 1000 an hour. Both eye and centering bend are formed with one operation. Any size eye may be formed within capacity of bender and ductile limits of material.

DI-ACRO BENDERS

DI-ACRO precision bending is accurate to .001" for duplicated parts. DI-ACRO Benders bend angle, channel, rod, tubing, wire, moulding, strip stock, etc. Machines are easily adjustable for simple, compound and reverse bends of varying radii.

Send for Catalon "DIF-LESS DUPLICATING"

showing many kinds of "DIE-LESS DUPLI-CATING" produced with DI-ACRO Benders. Brakes and Shears.



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Forming radius up to 2". Capacity 7/32" round cold rolled steel bar or equivalent. All DI-ACRO Benders have two - way action, right or left hand mounting and re-versible for ming nose.



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Forming Radius up to '. Capacity round cold rolled steel bar, formed cold to 1" radius. DI-ACRO Benders form bus bar and other strip stock both flat and edgewise.



BENDER

Forming radius up to 9". Capacity 1/4" round cold rolled steel bar, formed cold to 1" ra-dius. Bender No. 3 is especially design-ed for aircraft,





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General Flexible Power Presses have increased production on many straightening operations because of these fundamental advantages: (1) Operator, by stepping on the foot pedal, controls the length of each ram stroke and the amount of pressure applied; (2) Operator has both hands free to handle the work.

For other important G-F-P Press features and uses, ask for new Bulletin No. 371.

To step up

Production
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Sizes 3 to 60 Tons

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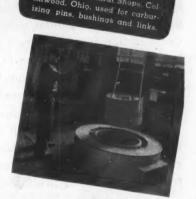
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POWER PRESS

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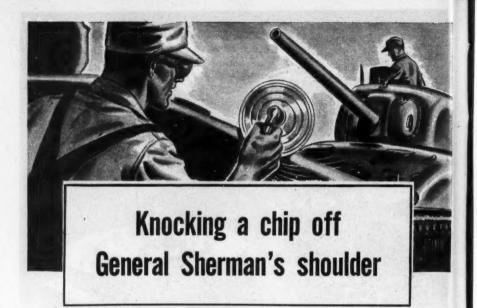
Your maintenance shop has only one purpose—to keep rolling stock rolling. To keep it rolling, repairs must be done with all possible speed and this takes modern equipment. Take heat treating—many of the railroads, looking forward to the necessary post war rehabilitation program, are replacing out-of-date heat treating equipment with modern electric Hevi Duty Furnaces. There is a type and size for your specialized needs—

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FROM treads to turret, American tanks are fitted with a watchmaker's precision. And Armour's Fibre Combination Sanding Discs are helping to get this flawless fit by polishing parts precisely and quickly!

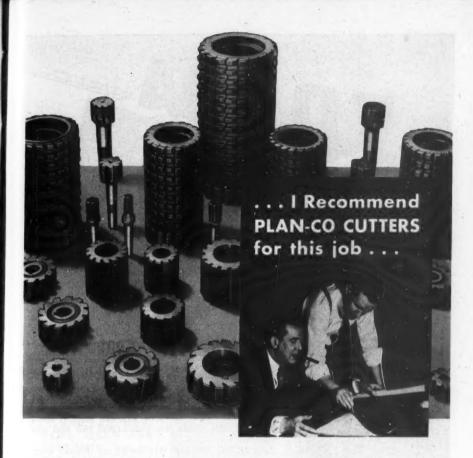
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Years of on-the-job milling experience make these the exceptional cutters you've been looking for!

For years Plan-O-Mill engineers and master mechanics worked with milling cutters—as users, as well as manufacturers.

Problems of threading and forming a wide variety of "difficul" jobs had to be solved. In solving them some very definite conclusions on the improvement of both thread and form milling cutters were arrived at. These have been embodied in the exceptional tools now offered by Plan-O-Mill.

Longer tool life, more parts per grind, and more grinds per tool are provided by Plan-O-Mill cutter design. Quality built into Plan-O-Mill cutting tools by superb craftsmen is preserved by a policy of rigid inspection with the most modern equipment.

Send for this folder! Facts on ordering; hints on sharpening. Yours for the asking.



THREAD AND FORM PLAN-O-MILL CORPORATION THREAD AND FO



Agents in all principal cities throughout the World.



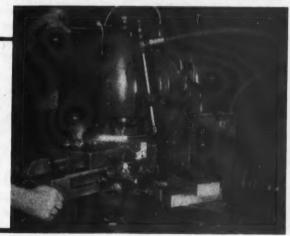
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lies on alertness here! To keep

METAL CUTTING machinery in full wartime production use . . .

COOLANTS. These oils promote highest cutting speeds and finer finish on all types of metals. They save on power consumption and tool regrind expense. Sinclair provides diversified, specialized cutting oils to suit all individual problems.

(Write for "The Service Pactor"—published periodically and deseted to the solution of lubricating problems.)



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FOR FULL IMPORMATION OR LUBRICATION COUNSES, WRITE SINCLAIR REPINING COMPANY (INC.), 430 FIFTH AVENUE, NEW YORK 30, N. Y.



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ARE MANUFACTURED—And be maintained quality and MID-WEST engineers have maintained quality and dependability in MID-WEST honing and superfinishing stones by exercizing unusual care during the maintained trying processes—from selection of the raw materials to packaging the finished product. That care, coupled to packaging the finished product. That care, coupled with MID-WEST'S extensive experience in the abrasive field, has ensured a product that aux faster, seek field, has ensured a product that aux faster, seek field, has ensured a product that aux faster, seek field, has ensured a product that aux faster, seek field, has ensured a product that aux faster, seek field, has ensured a product that aux faster, seek field, has ensured a product that aux faster, seek field, has ensured a product that aux faster, seek field, has ensured a product that aux faster, seek field, has ensured a product that aux faster, seek field, has ensured a product that aux faster, seek field, has ensured a product that aux faster, seek field, has ensured a product that aux faster, seek field, has ensured a product that aux faster, seek field, has ensured a product that aux faster, seek field, has ensured a product that aux faster, seek field, has ensured a product that aux faster, seek field, has ensured a product that aux faster field fiel

MID-WEST honing and superfinishing stones perform than ordinary abrasive stones because they are than ordinary abrasive stones because they are markable new abrasive with MICRO BOND, the remarkable new abrasive developed and manufactured by MID-WEST specifically developed and manufactured by MID-WEST specifically developed and manufactured by MID-WEST specifically developed and superior finishing operations. Their speed, efficiency and economy will amaze you



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ABRASIVE COMPANY

Manufacturers of DEPENDABLE Abrasive

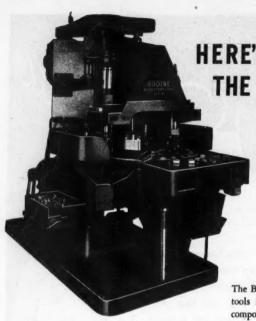
Detroit 11, Mich.



thickness. It is then spline broached and each finished ring makes 8 parts. This 8-at-a-time production accounts for 2,240 component parts per hour in one single high speed operation.

APOINTE

HAE 1000 COMPANY



DRILLING, MILLING, TAPPING, SCREW INSERTING SIMULtaneously

There are six standard sizes of Bodine machines . . . all of which may be adapted to a great variety of tooling set-ups. The smaller size, No. 40-10 requires but 54" x 60" floor space, the largest, No. 48-30, only 90" x 96". They accommodate from 6 to 8 spindles with capacities ranging from 4" to ½" dia., with vertical stroke from 12" to 3½ in depth.



TYPICAL OPERATIONS

This special (Bodine patented) setup is for rapid production of accurately located holes in a delicate ordnance component. Operations: 7 holes drilled (.5mm to 2.8mm dia.) with tolerance for center distance

.0004". By changing the dial and relocating spindles many different set-ups can be made on a single machine.

Ask Bodine engineers for better, faster methods. Bulletin on request.

Speed

"LET'S GET ON WITH THE WAR"

Common sense dictates relentless pursuit of the war effort. The iron is hot . . . it must not cool off. Industry can help enormously to bring a quicker and less costly victory if overconfidence is not allowed to bog down production.

Speed is the answer . . . continuing speed.

The BODINE is a fast machine. It gangs production tools for repetitive production of small armament components, accurately and continuously.

The Bodine basic principle, combining a series of drilling, milling, tapping and screw inserting operations in *one* machine . . . and providing extreme flexibility in locating multiple spindles around an automatic indexing dial, saves power, maintenance, floor space and man-hours.

Moreover, semi-skilled operators, especially women, can easily handle production at low fatigue factor. Electrical interlocks prevent damage to machine and tools, protect operator.

Parts are placed in position on the dial which carries them to progressive stations where tools located vertically, horizontally or inverted perform their different operations. Ejection may be manual or automatic, depending upon the nature of the part.



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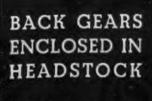
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With Patented Shifter Rack



Finger Tip Control for Easier, Faster Back Gear Shifting

The advanced back gear design permits placing the patented back gear shifter rack where it belongs... at the operator's finger tips. No longer is it necessary to reach over the headstock to operate the lever which shifts power to back gears. Not only is the position of the back gear shifter rack safer and more convenient, but it also saves valuable seconds every time the shift is made. Finger tip accessibility of the back gear shifter rack is just one of many reaches sons why you find Logan Lathes in shops with outstanding production and safety records. Note the wide and durable semi-steel back gears. Write today for information on all models of Logan Lathes.

Brief Specifications: Swing over bed. 10½" · Between centers. 24" · Bed length. 43½" · Spindle hole. 25/32" · Precision ground ways: 2 prismatic V-ways: 2 flat ways · 12 spindle speeds. 30 to 1450 r.p.m. · Protected by ball-bearings or self-lubricating bronse bearings.



No. 850 Manufacturing Lathe



Not 200 Back Geared Screw Cutting Lathe



A NAME TO REMEMBER WHEN YOU THINK OF LATHE

LOGAN ENGINEERING CO.

CHICAGO 30. ILLINOIS

One of a series describing the finer features of Logan Lathes . . . Look for the next of the series

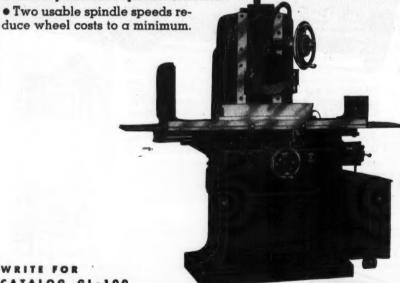
Hydraulic

GRAND RAPIDS Surface Grinders

To Meet 1944's Exacting Needs --- as nothing else can

- "Grand Rapids" Hydraulic Feed Surface Grinders guarantee tool room accuracy at table speeds up to 125 feet per minute.
- Heavy rugged one-piece column and base casting assures permanent alignment between the cross travel ways and the upright head.

• Patented vertical movement of wheel head makes it possible to split thousandths.



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No. 35 Precision Tool Room Type

GALLMEYER & LIVINGSTON CO.

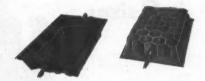
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PRECISION IS BUILT INTO EVERY OUNCE OF THESE MEEHANITE METAL SURFACE PLATES

HAND SCRAPED

Mechanite Metal is of fine close grain, uniform texture, unusual strength and solidity... metallurgical qualities that make high precision surface plates. These are one-third heavier than any other quality plates, and the weight is scientifically distributed by the honeycomb base. The surfaces are handscraped to extremely close tolerances.

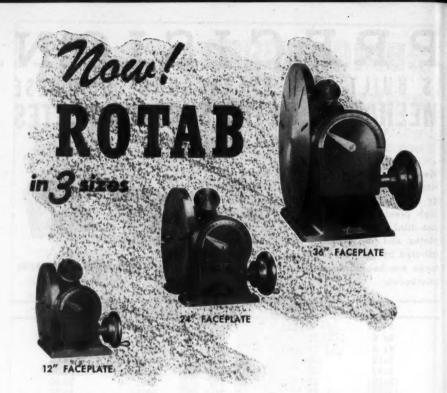


LOOK FOR THIS HONEYCOMB BASE

Size	APPROX. WEIGH	T HEIGHT	TOLERANCE	NET PRICE	
31/2×4	5 Lbs.	21/2"	,0001"	\$ 12.50	
6x 6	11 "	21/2"	.0001"	19.00	
8x 8	22 "	3"	.0001"	23.00	
8x12	38 "	31/2"	.0001"	35.00	
9x12	40 "	31/2"	.0001"	35.00	
10x10	43 "	31/2"	.0001"	35.00	
12×12	50 "	31/2"	.0001"	43.00	
12×18	985 "	4"	.0001"	68.00	
14x18	100 "	4"	.0001"	75.50	
16x16	100 "	4"	.0001"	75.00	
18×18	140 "	41/2"	.0001"	98.00	
18×24	200 "	5"	.0001"	133.00	
18x36	310 "	61/4"	.0002"	174.00	
20x20	160 "	41/2"	.0001"	123.50	
20×30	325 "	51/4"	.00025"	190.50	
24×24	334 "	61/2"	.00025"	180.00	
24x36	475 "	61/2"	.00025"	275.00	
30x36	510 "	7"	.00025"	345.00	
30×60	1425 "	10"	.00025"	596.50	
31×78	2100 "	10"	.0003"	827.00	
48×72	3600 "	11"	.0003"	1054.00	
48×96	6000 "	12"	.0005"	1468.00	
	FOR PROPELLER		RIBBED PATTE		
8x42	238 Lbs.	6"	.0001"	98.00	
10x36	225 "	6"	.0001"	115.70	

Other sizes to specification. Angle plates and straight edges of Mechanite Metal also available. Good deliveries on most sizes. Write for folder.

ACME TOOL COMPANY 202 CHURCH STREET



The ROTAB simplifies machining or checking.

The face plate can be rotated to any degree and adjusted to any angle from the vertical to the horizontal position and to 30° below the horizontal the opposite way.

Dials showing both degree and minute graduations register the rotary and angular settings.

Adjustable degree ring under face plate to avoid excessive turning of the handwheel to obtain the zero setting.

Sturdy bearings to hold faceplate in position. Ample clamping facilities.

A sine bar is furnished to provide greater accuracy on angular settings.

Also Manufacturers of Precision Surface Plates—Angle Plates—Parallels, etc.—RESCRAPING to proved master plates.

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Rapid Duplication



RIGHT OR LEFT HAND THREADS

INTERNAL OR EXTERNAL

COULTER





Any parts that can be held in ordinary chucks, air operated chucks, air operated collet chucks, or special face plate fixtures...can be threaded on this machine.

Set cam-controlled automatic cycle on first piece. Thereafter, cutter feeds into work to proper depth and at correct pitch and withdraws when cut is completed. Work and cutter spindles are driven by individual motors through worm drive, affording ample power throughout the wide range of feeds and speeds.

Write for complete specifications.

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Speeds PRODUCTION



HNSON

METAL CUT-OFF

4 CUTTING SPEEDS

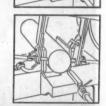
10" x 18" CAPACITY

CORRECT CONSTANT FEED

OTHER FEATURES:

Rigid box-type frame - Sturdy over-all construction—Three point base - Wide range in cutting speeds - Quick acting vise - Im-WET CUTTING ATTACHMENT FOR THIS DRY MODEL ALSO AVAILABLE

proved hydraulic control - Bolt action stock stop - Ball bearing motor - Extremely simple operation.



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THAT'S ALL WE'VE
MANUFACTURED SINCE
1887 FIFTY SEVEN
YEARS OF INDUSTRIAL
INTEGRITY LIE BEHIND
THE TRADE-WISE PHRASE

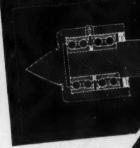
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SEBASTIAN LATHES

manufactured by

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Ball Bearings

QUADRO Precision LIVE CENTERS..

QUADRO Precision LIVE CENTERS will outlast old-fashioned solid centers to pay for themselves quickly. They combine the rigidity of the solid lathe center with the frictionless properties of the ball-bearing to form a tool which will increase production without sacrificing accuracy. Manufactured in all tapers and sixes.

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Now you can equip every machine tool for higher production with a compact, portable, low cost Atlas Coolant Pump—screw machines, lathes, drill presses, milling machines, cut-off saws. Cuts tool wear, cuts rejections for poor finish. Powerful centrifugal type pump handles any cutting fluid; flow is adjustable from drip to stream. Two models, universal or induction motor, handling 450 and 225 GPH. Feed lines are durable, tough

extruded plastic. Ask your Atlas distributor for full details about Atlas Coolant Pumps or write us. Ready for immediate delivery.



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KNOCK-OUT UNIVERSAL CARBIDE TOOL GRINDERS . . .

Are used the world over. All grinding operations necessary on carbide tipped tools can be accomplished at low cost and minimum set-up time.







This new literature is yours. Write for: Bulletin CTG-43-MM for illustrative literature on the Universal Carbide Tool Grinder... Bulletin UTG-43-MM for illustrative literature on Universal Tool Grinder.

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Coolant model of compact, dependable design, available for high speed, continuous, straight line production.

Standard money-saving equipment in several thousands of up-to-date metal working plants.

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MODERN MACHINE SHOP

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March, 1944

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MACHINE MAINTENANCE



TESTED and PROVED in WAR SERVICE

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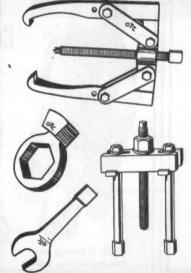
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OTC War experience is forging better machine maintenance tools for reconverted production after VICTORY!



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Style H Facing and **Counterboring Tool**



Cut Cost—Increase Production

with GENESEE inserted blade-

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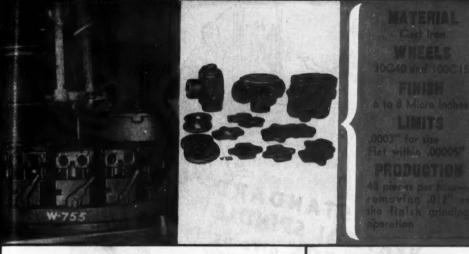
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GENESEE MFG. CO.

ROCHESTER 4, NEW YORK

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USE BLANCHARD WHEELS ON BLANCHARD GRINDERS



Oil Burner Pump Parts Ground on No. 18 Blanchard Surface Grinder.



BLANCHARD CYLINDER WHEEL

Blanchard Surface Grinders equipped with Blanchard Grinding Wheels eliminate lapping of parts which require flat surfaces and tight joints.

For example, oil burner parts ground on a No. 18 Blanchard Surface Grinder are rough ground by using Blanchard Wheel 30C40. For finishing after normalizing, Blanchard Wheel 100C15 is used, holding to limits of .0003" for size and flat to .00005".

This is a good example of where the use of Blanchard Wheels results in greater production — finer finish — and elimination of lapping. Reason — Blanchard knows how to fit the wheel to the work.

Blanchard invites you to send samples of your work for their wheel recommendations.



The Booklet "Blanchard Wheels" contains helpful information on the selection of grinding wheels for all kinds of work—sent free on request.



The BLANCHARD MACHINE COMPANY

64 STATE STREET, CAMBRIDGE, MASSACHUSETTS







Right—it can be easily mounted on your Planers, Boring Mills, Shapers, Milling Machines, etc. Adaptable for Wet or Dry Grinding.

PRECISION INTERNAL-EXTERNAL GRINDERS

For use on Lathe, Shaper, Planer, Boring Mill, etc. A 2 in 1 Tool — You can grind externally, and in a few minutes mount an interchangeable Quill for internal grinding up to 24" deep.

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wide range of
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wheels. Buffing
and Polishing
Machines up to
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Speed Lathes.

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...for 25 years

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in <u>precision</u>

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EX-CELL-O CORPORATION DETROIT 6, MICHIGAN





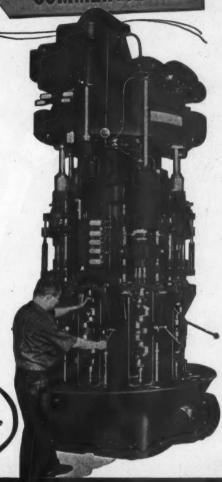
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Still PRODUCTION INCREASER another

8-SPINDLE ROTARY INDEXING DRILLING, REAMING, TAPPING MACHINE

Still another example of special design by Sommer and Adams to fill a special purpose - an 8spindle machine, central column type, with multiple heads for drilling. tapping, countersinking and reaming holes in crankshaft flanges. Operation is entirely mechanical and electrical. Heattreated drive gears, hardened and ground worms, and hard bronze worm gears suggest superior materials and workmanship. A machine that gives production plus accuracy.

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Sommer & Adams Co.
places at your command a
25-year acquaintance with the
intricacies of special machine
design and construction.





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Custom-Built EQUIPMENT FOR MANY PURPOSES.

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Let Today's Higher Production Pave The Way to Tomorrow's Lower Costs...

PNEUMATIC BAR FEED

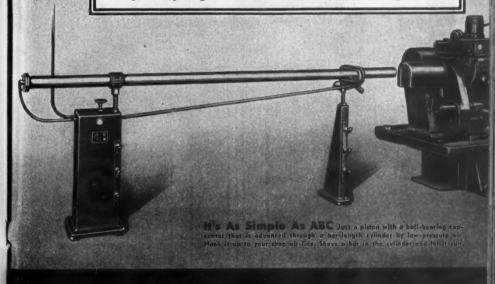
saves up to 20 minutes on a 12' bar

The minutes which the Lipe Pneumatic Bar Feed will save you on every 12' bar can be vitally important in speeding war materials to the fighting fronts today. But think what those same 20 minutes per bar will mean in the cost of your product after the war. Think what the lower-product-cost will mean to your salesmen when they are out fighting on postwar competitive fronts.

Saves Time, Motions, Materials

Lipe Pneumatic Bar Feed eliminates needless time and motions in feeding the bar . . . cuts down on scrap losses by using the bar to the smallest possible remnant . . . never feeds short . . . reduces rejects and refinishing by preventing scratched and marred pieces. You can use exact-size polished stock, thus doing away with one finishing operation. And the entire bar is inclosed -no whipping ends, no special guards required. No troublesome feed fingers and parts.

Works on any screw machine with fixed stop. Available for automatic screw machines Nos. 00, 0, 2 and 6, and for hand screw machines up to 21/2" capacity. Write today for a nearby technical representative to call. No obligation.





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MOVE UP THE SCHEDULE **
WIN THE WAR QUICKER

• On many parts where tapping follows drilling on a long job a two spindle Footburt will provide a fast, economical answer to your production problem. Footburt sensitives are built with the wide range of speeds and with the power and sturdiness to drive cutting tools to their full capacity. They are built with the care and precision that will keep them accurate over a long period. Write, wire or phone for prices and delivery information.

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-Increasing Production

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and various machine tools. Also for Brown & Sharpe and Cleve-Automatic Screw Machines.

> It is actually keeping users ahead of schedules by increasing production up to 25% to 300% and slashing costs. No belts to shift-drives to large step of cone at all speeds. Eliminates overhead line and countershafts. All advantages of geared head with belt drive smoothness. See your dealer or write for details.

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